KUSKOKWIM RIVER SALMON SUBSISTENCE TEST FISHERY, 1988

By

Kuskokwim Fishermen's Cooperative

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PREFACE

The Commercial Fisheries Division of the Alaska Department of Fish and Game (ADF&G) has estimated subsistence salmon harvests along the Kuskokwim River on a post-season basis since statehood. In recent years limited funding has resulted in a reduced or eliminated subsistence harvest survey program. However, prior to the 1988 season funding became available to conduct both an in-season monitoring and a post-season survey project. The in-season monitoring project was intended to provide information to ADF&G and to the Kuskokwim River Salmon Working Group on 1) whether local subsistence salmon harvest needs were being met for the current season, and 2) the general timing and abundance of the salmon returns. Due to limited staff available to supervise this project, it was decided to contract the work to the private sector. The contract was awarded to the Kuskokwim Fishermen's Cooperative (KFC) under a competitive bid procedure.

The report which follows is an unedited copy of the report prepared by the KFC as submitted to ADF&G in September 1988. In addition there are three attachments that were not part of the original report. They are:

Attachment A: Map of the study area prepared by ADF&G staff.

Attachment B: Letter from ADF&G to KFC regarding review comments on report as submitted. Note that a revised draft was not prepared.

Attachment C: Memorandum from Robert Conrad to Rich Randall regarding recommendations for the 1989 study based on the 1988 results.

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE SURVEY FINAL REPORT 1988

General Description

The Alaska Board of Fisheries established a Kuskokwim River Salmon Working Group to provide inseason coordination with the Department of Fish and Game's Commercial Fisheries Division in Bethel. This group is made up of representatives of the various fishing interests on the Kuskokwim. The primary purpose for this group is to provide input during the commerical fishery into the department's salmon management program utilizing data collected inseason on subsistence catches for specified sections on the river; test fishery data; escapement data; prior year data.

The work group established a subsistence salmon survey program to facilitate collection and preparation of inseason subsistence data as a component of the Kuskokwim River Salmon Management Plan. This program provides the working group an up to date status of subsistence harvests from a sample of fishermen from twelve different locations along the river during the months of June, July, and August. Data collected from this survey is used to evaluate trends in subsistence catches during the commercial salmon fishing season. This assists the work group in determining relative magnitude and timing of salmon runs for purposes of establishing commercial fishing periods.

In order for this project to be implemented successfully the work group required an organization with the resources and familiarity with the subsistence fishery and the people along the Kuskokwim river. This project also had to start right away in June 1988 in order to provide adequate coverage for the enitre fishing season. The Kuskokwim Fishermen's Cooperative was selected to perform this task. A Subsistence Survey Coordinator was hired in the latter part of May to identify survey monitors from each reporting sector, establish a radio and telephone communications network, prepare data collection forms and a data management program on computer. In addition a survey data entry clerk was hired in June to assist in entering data and preparing reports. The survey project operated in the Kuskokwim Fishermen's Cooperative offices at 751 6th Avenue in Bethel.

Survey Locations & Demographics

For the 1988 season the Kuskokwim was divided into twelve sections beginning from the mouth of the river on up to Chuathbaluk. Survey monitors were selected from the following:

Location #	Village/Fish camp
1	Tuntutuliak;
2	Tuntutuliak fish camp near the mouth of the Johnson river;
3	Napakiak;
4	Napaskiak;
5	Nick O' Nick's fish camp just above Oscarville;
6	Bethel to collect harvest by fish camps along Steamboat Slough near Bethel;
7	Kwethluk Y' fish camp;
8	Akiachak;
9	Akiak;
10	Tuluksak;
11	Kalskag;
12	Chuathbaluk.

Chuathbaluk is located in the middle Kuskokwim river area 160 miles above Bethel with a population of 100 or more. Of that, about 7 families are included in the report. Upper and Lower Kalskag is located 100 miles above Bethel with a combined population of around 438. Reports were primarily from the few fishcamps near Kalskag. Tuluksak population is near 350. About 23 families from Tuluksak were included in the reports this summer. Akiachak consists of about 451 and about 10 families' catch were reported. Akiak has an estimated population of 300 and 24 families were included in the reporting this summer. Kwethluk has a population of 538 and 10 families catch were reported. Reports from Kwethluk came primarily from a fish camp resident near the Y' below Kwethluk. Bethel has a population of about 4,462 and 17 families were surveyed from Bethel and from fish camps in the Steamboat slough. Nick O'Nick fish camp is located below Bethel near Oscarville. 39 families were reported from that and other nearby fish camps between Nick's fish camp and Bethel. Napaskiak has a population of 324 and estimated 33 families were included in the reports. Napakiak is located about 6 and a half miles below Bethel with a population of 320 and 47 families were surveyed. 13 families were surveyed from Tuntutuliak fish camp. Tuntutuliak fish camp is located about fourteen miles below Bethel. Tuntutuliak has a population of 292. Catches from 30 fishermen from Tuntutuliak were included in the reports.

Survey Monitoring & Reporting

Monitors would survey each contact in person utilizing forms prepared by the survey coordinator. When weather or other circumstances would not permit in-person surveys to fishcamps, contacts were sometimes made by VHF. Reports did not always include all possible contacts from each location. As it was, reports reflected the number of fishermen who reported catches to the survey monitor. There were certain times, especially during silver season, that monitors surveyed their locations but no one was fishing. This is either due to weather or sufficient catches were already made by the surveyed fishermen.

Monitors from villages selected a mix of subsistence fishermen from the villages and surrounding fish camps. The majority of reports came from fishermen residing in fishcamps. Reports concentrated on main stem catches and not on tributary streams. Reports were prepared by the monitors once a day Monday through Friday. The weekend data was reported on Monday. Monday's data was reported on Tuesday and Tuesday's was reported on Wednesday and so on. If a monitor missed one report he/she was contacted by the coordinator the following day. ? The day after a commercial opening monitors would not have to report because subsistence fishing was closed during that period. Monitors reported to the coordinator by phone or on VHF radio. On occassion reports were brought in-person to the coordinator.

Survey Statistical Description

The report provided by the monitors included: the date; fishermen identification number; location; soak time; whether set or drift; mesh size and depth; fathoms of net; and number of fish by species. A fishermen identification number was provided by each monitor to assist in determining consistency of reporting by individual fishermen.

Once collected, the data was then entered into an Apple Macintosh SE computer utilizing a Microsoft Excel program; sorted by date, location, and mesh size (<=6 or >6). The Microsoft Excel worksheets included: fishermen id #; date; location #; whether set or drift; soak time; mesh size; mesh depth; fathoms length of net; number of catch and CPUE by species. The CPUE calculation in the worksheets included the following formula: (6,000 X catch) / (fms net X soak time). Soak time was reported in hours or minutes, but was entered on the worksheets in hours (minutes were entered as a decimal of hours). The CPUE calculation converted the hours into minutes for the formula. After the data was sorted by date and location, a summary calculation was made by the computer utilizing a macro application in Excel. This summary calculation included: the number of fishermen reported; date; location #; mesh size; sum of catch by species; calculation of average of CPUE's reported by species. Up to date printed reports included: raw data with summaries per location; a summary report by location and net size; and by-species charts of each location according to net size. Raw data and summaries were printed on

regular computer paper utilizing a wide carriage dot matrix printer. Charts were then printed on 8 1/2" X 11" paper utilizing a laser printer. Both Microsoft Excel's charting program and Microsoft Word were utilized to prepare the printed charts. These reports were prepared once a week for each of the Kuskokwim River Salmon Work Group meetings which occurred weekly during the season. Included with this report is a table of summary CPUE's with cumulative calculations; charts for each cumulative calculation by mesh size and location; daily charts of CPUE by mesh size and location. Conversion to IBM applications is possible with the Apple Macintosh. The Microsoft Excel program reads and writes Lotus 123 files, it can also prepare data in ASCII format. A Macintosh communications program is available to transfer files to the department's Compaq computers in Bethel.

Evaluation of Data Collection and Outline of Problems

The reporting form and format was simple enough for reporting. Data entry and report preparation was performed utilizing a rather simple to use computer data management system. We plan to improve the report preparation process by writing into the computer program, an application macro that would allow the computer to sort, tabulate, summarize, chart, and then print without a lot of user intervention. This would allow a better use of the Survey Coordinator's time.

Having twelve reporting sections and attempting adequate reporting of data was difficult. There is just too much data to collect and prepare. Because of the time consuming nature of the project we were forced to hire an additional person to perform data entry, help prepare reports, and maintain communications. Twelve monitors is too many to coordinate and attempt to maintain continous communications with. Some did not have a phone or VHF of their own.

There was also a problem with turn-over in some of the monitors. Monitors were also not always available. New survey monitors had to be recruited and trained in a timely manner as was possible. This was time consuming and expensive. The project can still be maintain using as many as six reporting sections rather than twelve. Alternates would also be needed at these locations to keep consistency of reporting information because some monitors went commercial fishing, picking berries, or hunting which delayed reporting.

As for the six locations: Tuntutuliak, Tuntutuliak fish camp, Napaskiak or Nick O'Nick's fish camp, Akiachak or Akiak, Tuluksak or Kalskag, and Chuathbaluk. These locations would provide an adequate number for reporting and efficient management of the survey effort. They are spaced far enough from each other to provide a fair sample of salmon subsistence catches during the commercial season. There are also enough subsistence fishermen in these locations to justify the number of locations for the survey effort.

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

TUNTUTULIAK

	LOC		KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6 >6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/7	1	X	20	20	80	80	0	0	0	0	0	0
6/8	1	X	69.33	89.33	93.33	173.33	0	0	0	0	0	0
6/9	1	X	74.67	164	114.7	288	0	0	0	0	0	0
6/10	1	X	19.5	183.5	1.17	289.17	0	0	0	0		0
6/14	1	X	58.82	242.32	2035	2324.46	105.9	105.88	0	0	0	0
6/18	1	X	9.25	251.57	116.8	2441.21	10.5	116.38	0	0		0
6/21	1	X	4	255.57	126.7	2567.88	0	116.38	0	0		0
6/23	1	X	7.61	263.18	71.4	2639.28	20.07	136.45	0	0		0
6/27	1	X	18.75	281.93	290.6	2929.87	67.07	203.52	0	0		0
6/29	1	X	10.18	292.11	391.8	3321.63	13.33	216.85	0	0		0
6/30	1	X	1	293.11	139	3460.63	6	222.85	0	0		0
7/6	1	X	0	293.11	440	3900.63	8	230.85	0	0		0
7/7	1	X	4	297.11	290	4190.63	12	242.85	0	0		0
7/10	1	X	8	305.11	920	5110.63	40	282.85	0	0		0
7/12	1	X	7.84	312.95	808.2	5918.82	0	282.85	0	0		0
7/13	1	X	0	312.95	100	6018.82	0	282.85	0	0		0
7/15	1	X	2	314.95	115.8	6134.62	0	282.85	0	0		0
7/16	1	X	0	314.95	50	6184.62	0	282.85	0	0		0
7/20	1	X	0	314.95	26.26	6210.88	0	282.85	0	0	0	0
7/22	1	X	0	314.95	100	6310.88	0	282.85	8	8	4	4
7/23	1	X	0	314.95	20	6330.88	0	282.85	4	12	0	4
7/25	1	X	0	314.95	60	6390.88	0	282.85	56	68	8	12
7/30	1	X	0	314.95	16	6406.88	0	282.85	9.33	77.33	0	12
8/2	1	X	0	314.95	0	6406.88	0	282.85	40	117.33	0	12
8/4	1	X	0	314.95	12.12	6419	0	282.85	30.3	147.63	0	12
8/9	1	X	0	314.95	0	6419	0	282.85	46	193.63	0	12
8/16	1	X	0	314.95	0	6419	0	282.85	285.64	479.27	0	12
8/17	1	X	0	314.95	0	6419	0	282.85	456	935.27	0	12
8/22	1	X	0	314.95	0	6419	0	282.85	84	1019.3	4	16
8/24	1	X	0	314.95	0	6419	0	282.85	80	1099.3	0	16
8/29	1	X	0	314.95	0	6419	0	282.85	75	1174.3	0	16

TUNTUTULIAK FISH CAMP

	LOC		KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6 >6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/8	2	X	5	5	22	22	0	0	0	0	0	0
6/10	2	X	29	34	5	27	0	0		0		0
6/14	2	X	5.67	39.67	18	45		0		0		0
6/15	2	X	5.33	45	47	92	6	6		0		0
6/17	2	X	7	52	80	172	5	11		0		0
6/21	2	X	39.09	91.09	883.6	1055.58	74.26	85.26		0		0
6/22	2	X	14	105.09	128	1183.58		85.26		0		0
6/23	2	X	12.09	117.18	178.5	1362.07	2.67	87.93		0		0
6/25	2	X	1	118.18	361	1723.07	0	87.93		0		0
6/27	2	X	3.33	121.51	152.7	1875.74	14.67	102.6		0		0
6/29	2	X	4	125.51	560	2435.74	32	134.6	4	4		0
6/30	2	X	2	127.51	341	2776.74	11	145.6		4		0
7/1	2	X	25	152.51	1700	4476.74	25	170.6		4		0
7/6	2	X	2.92	155.43	173.1	4649.82	2.48	173.08	0	4		0
7/7	2	X	8	163.43	735.4	5385.25	2.38	175.46	20	24		0
7/10	2	X	25	188.43	125	5510.25	0	175.46	0	24		0
7/16	2	X	0	188.43	287.5	5797.75	0	175.46	0	24		0
8/11	2	X	0	188.43	0	5797.75	0	175.46	1400	1424	0	0
8/17	2	X	0	188.43	0	5797.75	0	175.46	140	1564	2	2
8/30	2	X	0	188.43	0	5797.75	0	175.46	430.3	1994.3	0	2

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

NAPAKIAK

	LOC		KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6 >6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/4	3	X	3	3	0	0	0	0	0	0		
6/6	3	X	4	7	0	0	0	0	0	0		
6/7	3	X	5.33	12.33		0		0		0		
6/8	3	X	6.8	19.13	0.4	0.4		0		0		
6/15	3	X	22.67	41.8	59.67	60.07	10	10		0		
6/17	3	X	11.1	52.9	22.72	82.79	4.09	14.09		0		
6/18	3	X	4.33	57.23	134.7	217.46	18.67	32.76		0		
6/21	3	X	9.33	66.56	79	296.46	18.5	51.26		0		
6/22	3	X	6.89	73.45	150.2	446.68	37.06	88.32		0		
6/23	3	X	2.8	76.25	64	510.68	2.13	90.45		0		
6/25	3	X	5.39	81.64	58.5	569.18	7.67	98.12		0		
6/27	3	X	48	129.64	250	819.18	56	154.12		0		
6/29	3	X	1.33	130.97	45.33	864.51	17.33	171.45		0		
7/7	3	X	0	130.97	140.9	1005.4	33.33	204.78	0	0		
7/12	3	X	0	130.97	116	1121.4	10	214.78	0	0		
7/15	3	X	0	130.97	363.6	1485.04	6.06	220.84	0	0		
8/6	3	X	0	130.97	0	1485.04	0	220.84	295.02	295.02	0	
8/17	3	X	0	130.97	0	1485.04	0	220.84	174.86	469.88	0	
8/19	3	X	0	130.97	0	1485.04	0	220.84	132	601.88	0	
8/20	3	X	0	130.97	0	1485.04	0	220.84	121.21	723.09	0	
8/23	3	X	0	130.97	0	1485.04	0	220.84	128.07	851.16	0	
8/28	3	X	0	130.97	0	1485.04	0	220.84	160	1011.2	0	
8/29	3	X	0	130.97	0	1485.04	0	220.84	124	1135.2	0	

NAPASKIAK

	LOC		KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6 >6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/2	4	X	1.25	1.25	0	0	0	0	0	0	0	0
6/6	4	X	12	13.25	25.33	25.33	0	0	0	0	0	0
6/8	4	X	23.07	36.32	42.67	68	4.8	4.8		0		0
6/9	4	X	16	52.32	104	172	0	4.8	0	0	0	0
6/10	4	X	37.49	89.81	74.94	246.94	41.68	46.48		0		0
6/13	4	X	57.96	147.77	31.63	278.57	10	56.48		0		0
6/14	4	X	4.46	152.23	29.52	308.09		56.48		0		0
6/15	4	X	12.63	164.86	31	339.09	0	56.48		0		0
6/17	4	X	13.7	178.56	139.3	478.42	3.6	60.08		0		0
6/18	4	X	3.33	181.89	60.33	538.75	5.33	65.41		0		0
6/21	4	X	21.17	203.06	126.9	665.63	14.46	79.87		0		0
6/22	4	X	11.11	214.17	274	939.63	52.67	132.54		0		0
6/23	4	X	17	231.17	140	1079.63	33	165.54		0		0
6/27	4	X	9.33	240.5	148.7	1228.3	30.33	195.87		0		0
6/29	4	X	5	245.5	142.8	1371.05	9	204.87		0		0
6/30	4	X	1.33	246.83	169.3	1540.38	69.33	274.2		0		0
7/1	4	X	4	250.83	284	1824.38	16	290.2		0		0
7/6	4	X	0	250.83	300	2124.38	14	304.2	0	0		0
7/19	4	X	2	252.83	78	2202.38	0	304.2	0	0	0	0
8/9	4	X	0	252.83	2.33	2204.71	0	304.2	101.67	101.67	2.67	2.67

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

NICK O'NICK FISH CAMP

	LOC		KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6 >6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/2	5	X	0.83	0.83	0	0	0	0	0	0	0	0
6/3	5	X	1.35	2.18	0	0		0		0		0
6/4	5	X	1.04	3.22	0	0	0	0	0	0	0	0
6/6	5	X	4.88	8.1	0	0		0		0		0
6/7	5	X	4.54	12.64	5.07	5.07	1.74	1.74		0		0
6/8	5	X	1.22	13.86		5.07		1.74		0		0
6/9	5	X	5.67	19.53	3	8.07		1.74		0		0
6/10	5	X	10.46	29.99	12.36	20.43	0.89	2.63		0		0
6/11	5	X	5.3	35.29	17.95	38.38	11.85	14.48		0		0
6/13	5	X	8.69	43.98	28.74	67.12	9.07	23.55		0		0
6/14	5	X	16.06	60.04	46.67	113.79	1.11	24.66		0		0
6/15	5	X	3.33	63.37	1.67	115.46	0	24.66		0		0
6/21	5	X	11.83	75.2	269.9	385.32	12.61	37.27		0		0
6/22	5	X	5.33	80.53	469.3	854.65	20	57.27		0		0
6/23	5	X	5.5	86.03	109	963.65	20	77.27		0		0
6/25	5	X	0	86.03	247.4	1211.01	85.71	162.98		0		0
6/27	5	X	0.17	86.2	0.83	1211.84	0.83	163.81		0		0
6/29	5	X	6.76	92.96	291.3	1503.14	21.4	185.21		0		0
6/30	5	X	0	92.96	2.78	1505.92	0.28	185.49		0		0
7/1	5	X	6.05	99.01	787.8	2293.68	109.3	294.8		0		0
7/6	5	X	0	99.01	400	2693.68	50	344.8	0	0		0
7/7	5	X	2.67	101.68	528.1	3221.81	9.56	354.36	0	0		0
7/9	5	X	0	101.68	187.9	3409.69	48.48	402.84	0	0		0
7/12	5	X	50	151.68	200	3609.69	150	552.84	0	0		0
7/13	5	X	0	151.68	351	3960.69	100	652.84	0	0		0
7/15	5	X	0	151.68	101	4061.7	0	652.84	0	0	10.1	10.1
7/16	5	X	6.06	157.74	618.2	4679.88	6.06	658.9	0	0		10.1
7/23	5	X	0	157.74	1.25	4681.13	0	658.9	0.42	0.42	0	10.1
7/24	5	X	0	157.74	1.25	4682.38	0	658.9	0	0.42	0	10.1
7/26	5	X	0	157.74	0	4682.38	0	658.9	50	50.42	0	10.1
7/29	5	X	0	157.74	1.67	4684.05	0	658.9	1.25	51.67	2.08	12.18
7/30	5	X	0	157.74	0.42	4684.47	0	658.9	1.67	53.34	0.83	13.01
8/2	5	X	0	157.74	0	4684.47	0	658.9	0.83	54.17	0	13.01
8/3	5	X	0	157.74	0.83	4685.3	0	658.9	0.83	55	0	13.01
8/5	5	X	0	157.74	0	4685.3	0	658.9	2.08	57.08	2.08	15.09
8/6	5	X	0	157.74	0.42	4685.72	0	658.9	7.92	65	0	15.09
8/13	5	X	0	157.74	0	4685.72	0	658.9	54.4	119.4	0	15.09
8/19	5	X	0	157.74	0	4685.72	0	658.9	18.67	138.07	0	15.09
8/23	5	X	0	157.74	0	4685.72	0	658.9	1.67	139.74	0	15.09
8/24	5	X	0	157.74	0	4685.72	0	658.9	1.67	141.41	0	15.09
8/25	5	X	0	157.74	0	4685.72	0	658.9	1	142.41	0	15.09
8/26	5	X	0	157.74	0	4685.72	0	658.9	0.67	143.08	0	15.09

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

BETHEL/STEAMBOAT SLOUGH

	LOC		KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6 >6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/2	6	x	0.67	0.67	0	0	0	0	0	0	0	0
6/3	6	X	4.67	5.34	0	0	0	0	0	0	0	0
6/15	6	X	63.64	68.98	542.4	542.42	45.45	45.45		0		0
6/18	6	X	38.18	107.16	289	831.39	22.06	67.51		0		0
6/19	6	X	60.61	167.77	424.2	1255.63	72.73	140.24		0		0
6/22	6	X	23.53	191.3	164.7	1420.34	117.7	257.89		0		0
6/23	6	X	55	246.3	470	1890.34	77	334.89		0		0
6/26	6	X	30	276.3	1373	3263.64	594.7	929.56		0		0
6/27	6	X	21	297.3	700	3963.64	162	1091.6		0		0
6/29	6	X	0	297.3	4	3967.64	8	1099.6		0		0
6/30	6	X	0	297.3	1126	5093.74	118.5	1218.1		0		0
7/6	6	X	13.09	310.39	539	5632.71	35.15	1253.2	0	0		0
7/7	6	X	0	310.39	360	5992.71	52	1305.2	0	0		0
7/9	6	X	0	310.39	664.8	6657.48	55.3	1360.5	0	0		0
7/10	6	X	0	310.39	378.8	7036.27	57.58	1418.1	0	0		0
7/12	6	X	0	310.39	340	7376.27	48	1466.1	0	0		0
7/20	6	X	0	310.39	121.2	7497.48	0	1466.1	18.18	18.18	12.12	12.12
7/26	6	X	0	310.39	0	7497.48	72.73	1538.8	0	18.18	6.06	18.18
7/27	6	X	0	310.39	0	7497.48	0	1538.8	0.83	19.01	1.67	19.85
7/28	6	X	0	310.39	0	7497.48	0	1538.8	0	19.01	1.67	21.52
8/2	6	X	0	310.39	3.33	7500.81	0	1538.8	14.44	33.45	1.07	22.59
8/3	6	X	0	310.39	0	7500.81	0	1538.8	151.52	184.97	0	22.59
8/13	6	X	0	310.39	0	7500.81	0	1538.8	540.48	725.45	14.29	36.88
8/14	6	X	0	310.39	0	7500.81	0	1538.8	144	869.45	0	36.88
8/16	6	X	0	310.39	0	7500.81	0	1538.8	444.44	1313.9	0	36.88
8/22	6	X	0	310.39	0	7500.81	0	1538.8	187.59	1501.5	0	36.88
8/23	6	X	0	310.39	0	7500.81	0	1538.8	1	1502.5	0	36.88
8/24	6	X	0	310.39	0	7500.81	0	1538.8	58.82	1561.3	0	36.88
8/25	6	X	0	310.39	0	7500.81	0	1538.8	42.76	1604.1	0	36.88
8/26	6	X	0	310.39	0	7500.81	0	1538.8	56	1660.1	0	36.88

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

KWETHLUK Y' FISHCAMP

	LOC			KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6	>6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/6	7	X		8.69	8.69	9.7	9.7	1.62	1.62		0		
6/7	7	X		6.2	14.89	4.24	13.94		1.62		0		
6/8	7	X		11.43	26.32	3.81	17.75	7.62	9.24	0	0	0	
6/15	7	X		26.67	52.99	13.33	31.08	2.67	11.91		0		
6/17	7	X		1.56	54.55	19.95	51.03	9.98	21.89		0		
6/21	7	X		0.67	55.22	0.5	51.53	0.33	22.22		0		
6/22	7	X		40	95.22	103.3	154.86	30	52.22		0		
6/23	7	X		0.17	95.39	0.58	155.44	0.67	52.89		0		
6/25	7	X		20	115.39	4	159.44	22	74.89		0		
6/27	7	X		20	135.39	86.67	246.11	26.67	101.56		0		
6/29	7	X		8	143.39	320	566.11	40	141.56		0		
7/6	7	X		4	147.39	108	674.11	8	149.56	0	0		
7/7	7	X		0	147.39	166.7	840.78	0	149.56	0	0		
7/9	7	X		0	147.39	50	890.78	0	149.56	0	0		
7/12	7	X		1.92	149.31	263	1153.77	0	149.56	0	0		
7/27	7	X		0	149.31	44	1197.77	0	149.56	16	16	0	
7/30	7	X		0	149.31	12	1209.77	0	149.56	24	40	0	
7/31	7	X		0	149.31	12	1221.77	0	149.56	36	76	0	
8/3	7	X		0	149.31	0	1221.77	0	149.56	223.53	299.53	0	
8/5	7	X		0	149.31	83.33	1305.1	0	149.56	222.22	521.75	0	
8/6	7	X		0	149.31	0	1305.1	0	149.56	174.93	696.68	0	
8/7	7	X		0	149.31	11.76	1316.86	0	149.56	152.94	849.62	0	
8/13	7	X		0	149.31	0	1316.86	0	149.56	117.65	967.27	0	
8/16	7	X		0	149.31	0	1316.86	0	149.56	144	1111.3	0	
8/17	7	X		0	149.31	0	1316.86	0	149.56	77.61	1188.9	0	
8/21	7	X		0	149.31	0	1316.86	0	149.56	45.36	1234.2	0	
8/23	7	X		0	149.31	0	1316.86	0	149.56	156.71	1391	0	
8/25	7	X		0	149.31	0	1316.86	0	149.56	194.52	1585.5	0	
8/29	7	X		0	149.31	0	1316.86	0	149.56	26	1611.5	0	

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

AKIACHAK

	LOC		KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6 >6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/3	8	X	0.63	0.63	0	0	0	0	0	0	0	
6/4	8	X	0.63	1.26	0	0	0	0	0	0	0	
6/6	8	X	0.83	2.09	0	0	0	0	0	0	0	
6/7	8	X	1.67	3.76	1.04	1.04		0		0		
6/8	8	X	1.39	5.15	0	1.04	0	0	0	0	0	
6/9	8	X	44.44	49.59	33.33	34.37	29.41	29.41		0		
6/10	8	X	24.58	74.17	0.83	35.2	0.25	29.66		0		
6/11	8	X	1.33	75.5	2	37.2	0.67	30.33		0		
6/13	8	X	4.75	80.25	32.25	69.45	8.75	39.08		0		
6/14	8	X	15.97	96.22	4.86	74.31	2.08	41.16	0	0	0	
6/15	8	X	16.73	112.95	31.02	105.33	6.03	47.19		0		
6/17	8	X	20	132.95	11	116.33	22.5	69.69		0		
6/18	8	X	7.56	140.51	26.33	142.66	7.5	77.19		0		
6/21	8	X	22.63	163.14	86.45	229.11	47.49	124.68		0		
6/22	8	X	50.78	213.92	234.4	463.55	41.27	165.95		0		
6/23	8	X	8.77	222.69	79.86	543.41	57.81	223.76		0		
6/25	8	X	5.63	228.32	131.3	674.73	69.46	293.22		0		
6/27	8	X	35.25	263.57	92	766.73	78.75	371.97		0		
6/29	8	X	5.03	268.6	218.1	984.82	19.84	391.81		0		
6/30	8	X	8	276.6	190.3	1175.08	21.23	413.04		0		
7/1	8	X	134.3	410.9	397.6	1572.68	90.58	503.62		0		
7/4	8	X	8.44	419.34	1434	3006.48	235.1	738.73		0		
7/6	8	X	22.22	441.56	354	3360.51	55	793.73	0	0		
7/7	8	X	6.55	448.11	279.5	3640.03	18.14	811.87	0	0		
7/9	8	X	0	448.11	1541	5181.03	324.5	1136.4	0	0		
7/10	8	X	0	448.11	605.6	5786.59	105.6	1241.9	0	0		
7/12	8	X	0	448.11	240.5	6027.09	7	1248.9	0	0		
7/13	8	X	0	448.11	320.3	6347.36	6.06	1255	0	0		
7/15	8	X	4	452.11	35	6382.36	2	1257	0	0		
7/16	8	X	29.41	481.52	2.6	6384.96	0	1257	0	0		
7/19	8	X	0	481.52	83.27	6468.23	0	1257	0	0	0	
7/20	8	X	0	481.52	93.33	6561.56	0	1257	0	0	0	
7/22	8	X	0	481.52	54.08	6615.64	2	1259	7.04	7.04	0	
7/23	8	X	0	481.52	6.46	6622.1	0.83	1259.8	0.83	7.87	0	
7/29	8	X	0	481.52	66.24	6688.34	0	1259.8	82.93	90.8	0	
7/30	8	X	0	481.52	42.68	6731.02	0	1259.8	181.45	272.25	0	
8/2	8	X	0	481.52	7.56	6738.58	0	1259.8	37.22	309.47	0	
8/3	8	X	0	481.52	14.71	6753.29	0	1259.8	97.94	407.41	0	
8/5	8	X	0	481.52	7.21	6760.5	0	1259.8	52.48	459.89	0	
8/6	8	X	0	481.52	15.06	6775.56	0	1259.8	270.91	730.8	0	
8/9	8	X	0	481.52	3	6778.56	0	1259.8	107.06	837.86	0	
8/13	8	X	0	481.52	0	6778.56	0	1259.8	111.26	949.12	0	
8/19	8	X	0	481.52	0	6778.56	0	1259.8	24	973.12	0	
8/22	8	X	0	481.52	0	6778.56	0	1259.8	202.94	1176.1	0	
8/23	8	X	0	481.52	0	6778.56	0	1259.8	352.94	1529	0	
8/24	8	X	0	481.52	0	6778.56	0	1259.8	296.1	1825.1	0	
8/25	8	X	0	481.52	0	6778.56	0	1259.8	186.91	2012	0	

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

AKIAK

	LOC		KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6 >6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/6	9	X	0.21	0.21	0.42	0.42	0	0	0	0		0
6/7	9	X	5.33	5.54	0	0.42	0	0	0	0	0	0
6/8	9	X	4.67	10.21	13.33	13.75	0	0	0	0	0	0
6/9	9	X	1.04	11.25	0	13.75	0	0	0	0	0	0
6/10	9	X	0.74	11.99	0.45	14.2	0	0		0		0
6/14	9	X	1.04	13.03	4.44	18.64	4.24	4.24		0		0
6/15	9	X	0	13.03	6.5	25.14	0	4.24		0		0
6/17	9	X	1.74	14.77	4.01	29.15	2.43	6.67		0		0
6/21	9	X	0	14.77	13.58	42.73	0	6.67		0		0
6/22	9	X	0.14	14.91	9.03	51.76	0.35	7.02		0		0
6/23	9	X	8.89	23.8	160	211.76	128.9	135.91		0		0
6/25	9	X	4	27.8	14.83	226.59	0	135.91		0		0
7/3	9	X	102.9	130.7	588.2	814.83	73.53	209.44	0	0		0
7/6	9	X	56	186.7	736	1550.83	0	209.44	0	0		0
7/10	9	X	14.62	201.32	444.8	1995.63	67.13	276.57	0	0		0
7/13	9	X	0	201.32	1.94	1997.57	0	276.57	0	0		0
7/16	9	X	0	201.32	0.95	1998.52	0	276.57	0	0		0
7/20	9	X	4	205.32	200.9	2199.38	0	276.57	0	0	0	0
7/30	9	X	0	205.32	0.71	2200.09	0	276.57	0.12	0.12	0	0
8/6	9	X	0	205.32	71.43	2271.52	0	276.57	494.05	494.17	0	0
8/7	9	X	0	205.32	64	2335.52	0	276.57	496	990.17	0	0
8/11	9	X	0	205.32	0	2335.52	0	276.57	48	1038.2	0	0
8/14	9	X	0	205.32	0	2335.52	0	276.57	0.56	1038.7	0.28	0.28
8/16	9	X	0.31	205.63	0	2335.52	0	276.57	1.56	1040.3	0	0.28
8/24	9	X	0	205.63	0	2335.52	0	276.57	432.28	1472.6	0	0.28
8/26	9	X	0	205.63	0	2335.52	0	276.57	734.85	2207.4	0	0.28

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

TULUKSAK

	LOC		KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6 >6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/7	10	X	2.17	2.17	12.39	12.39	0.37	0.37		0		0
6/8	10	X	3.19	5.36	5.81	18.2	0.11	0.48		0		0
6/9	10	X	2.93	8.29	7.52	25.72	0.63	1.11		0		0
6/10	10	X	7.03	15.32	10.58	36.3		1.11		0		0
6/11	10	X	11.67	26.99	48.18	84.48	5.67	6.78		0		0
6/13	10	X	12.5	39.49	47.92	132.4		6.78		0		0
6/17	10	X	6.84	46.33	19.9	152.3	0	6.78		0		0
6/18	10	X	20.38	66.71	35.69	187.99	0	6.78		0		0
6/21	10	X	134	200.71	0	187.99	0	6.78		0		0
6/22	10	X	25.93	226.64	74.81	262.8	0	6.78		0		0
6/23	10	X	7.33	233.97	54	316.8	0	6.78		0		0
6/26	10	X	21	254.97	5	321.8	0	6.78		0		0
6/27	10	X	20	274.97	4	325.8	0	6.78		0		0
6/29	10	X	5.95	280.92	5.95	331.75	236.7	243.51		0		0
6/30	10	X	5.83	286.75	119.5	451.25	7.5	251.01		0		0
7/6	10	X	0	286.75	200	651.25	0	251.01	0	0		0
7/7	10	X	1	287.75	115	766.25	0	251.01	0	0		0
7/12	10	X	17.65	305.4	205.9	972.13	0	251.01	0	0		0
7/19	10	X	12.94	318.34	0	972.13	76.06	327.07	68.29	68.29	0	0
7/20	10	X	9.19	327.53	32.61	1004.74	0	327.07	16.57	84.86	0	0
7/23	10	X	0	327.53	32	1036.74	48	375.07	0	84.86	0	0
7/29	10	X	0	327.53	22	1058.74	10	385.07	12	96.86		0
7/31	10	X	0	327.53	56.66	1115.4	18.23	403.3	46.39	143.25		0
8/3	10	X	0	327.53	24	1139.4	0	403.3	56	199.25	0	0
8/13	10	X	0	327.53	0	1139.4	0	403.3	35.29	234.54	0	0
8/17	10	X	0	327.53	30.2	1169.6	15.69	418.99	132.94	367.48	0	0
8/20	10	X	0	327.53	16.02	1185.62	8.25	427.24	64.29	431.77	0	0
8/21	10	X	0	327.53	84.85	1270.47	12.12	439.36	96.97	528.74	0	0
8/26	10	X	0	327.53	5.33	1275.8	3.56	442.92	26.67	555.41	17.78	17.78

KALSKAG

	LOC		KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6 >6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/8	11	X	2.86	2.86		0		0		0		
6/11	11	X	0.21	3.07	0.42	0.42	0.21	0.21		0		
6/12	11	X	2.21	5.28	2.42	2.84		0.21		0		
6/13	11	X	9.93	15.21	9.25	12.09	0.26	0.47		0		
6/15	11	X	10	25.21	61.43	73.52	0	0.47		0		
6/17	11	X	15.84	41.05	14.29	87.81	0	0.47		0		
6/18	11	X	7.14	48.19	12.86	100.67	0	0.47		0		
6/19	11	X	3	51.19	8	108.67	2	2.47		0		
6/23	11	X	5.71	56.9	162.9	271.53	0	2.47		0		
6/24	11	X	12.86	69.76	34.29	305.82	0	2.47		0		
6/26	11	X	6.67	76.43	56.67	362.49	0	2.47		0		
6/28	11	X	0.92	77.35	3.75	366.24	0.33	2.8		0		
8/9	11	X	0	77.35	0	366.24	0	2.8	2.08	2.08	0	
8/11	11	X	0	77.35	0	366.24	0	2.8	157.58	159.66	0	

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

CHUATHBALUK

	LOC		KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6 >6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/11	12	X	8	8	12	12	0	0	0	0	0	
6/12	12	X	5.78	13.78	5.33	17.33	2.22	2.22		0		
6/13	12	X	0	13.78	0	17.33	3.33	5.55	0	0	0	
6/14	12	X	1.67	15.45	6.74	24.07	0	5.55		0		
6/15	12	X	3.33	18.78	26.67	50.74	0	5.55		0		
6/16	12	X	14.22	33	4.94	55.68	0	5.55		0		
6/18	12	X	6.85	39.85	74.81	130.49	1.11	6.66		0		
6/19	12	X	19.45	59.3	31.67	162.16	0	6.66		0		
6/20	12	X	23.33	82.63	45	207.16	1.67	8.33		0		
6/21	12	X	13.44	96.07	45.56	252.72	1.83	10.16		0		
6/22	12	X	3.41	99.48	73.48	326.2	1.48	11.64		0		
6/23	12	X	9.33	108.81	54.67	380.87	0	11.64		0		
6/25	12	X	11.5	120.31	134.2	515.04	9.17	20.81		0		
6/26	12	X	10.83	131.14	97.5	612.54	3.33	24.14		0		
6/27	12	X	1.67	132.81	73.33	685.87	3.33	27.47		0		
6/28	12	X	3.33	136.14	136.7	822.54	16.67	44.14		0		
7/5	12	X	1.67	137.81	74.89	897.43	5	49.14		0		
7/6	12	X	1	138.81	138.3	1035.76	13.67	62.81	0	0		
7/7	12	X	2	140.81	127	1162.76	18.67	81.48	0	0		
7/8	12	X	4	144.81	144	1306.76	0	81.48	0	0		
7/9	12	X	3.33	148.14	130	1436.76	3.33	84.81	0	0		
7/10	12	X	0	148.14	88.33	1525.09	0	84.81	0	0		
7/11	12	X	0	148.14	230	1755.09	0	84.81	0	0		
7/12	12	X	0	148.14	1.5	1756.59	0	84.81	0	0		
7/14	12	X	0	148.14	126.7	1883.26	6.67	91.48	0	0		
7/17	12	X	0	148.14	1.67	1884.93	0	91.48	0	0		
7/18	12	X	0	148.14	4.38	1889.31	0.33	91.81	0	0		
7/19	12	X	1.67	149.81	17.22	1906.53	0	91.81	0	0	0	
7/23	12	X	0	149.81	1.39	1907.92	0	91.81	0	0	0	
7/24	12	X	0	149.81	2.12	1910.04	0	91.81	0	0	0	
7/25	12	X	0	149.81	0.69	1910.73	0	91.81	0	0	0	
7/26	12	X	0	149.81	10.58	1921.31	0	91.81	0	0	0	
7/30	12	X	0	149.81	1.5	1922.81	0	91.81	0	0	0	
7/31	12	X	0	149.81	1.33	1924.14	0	91.81	0	0	0	
8/1	12	X	0	149.81	0.5	1924.64	0	91.81	0	0	0	
8/5	12	X	0	149.81	0.69	1925.33	0	91.81	0.28	0.28	0	
8/7	12	X	0	149.81	3.61	1928.94	0	91.81	6.94	7.22	0	
8/8	12	X	0	149.81	1.25	1930.19	0	91.81	0.42	7.64	0	
8/9	12	X	0	149.81	0.83	1931.02	0	91.81	16.74	24.38	0	
8/14	12	X	0	149.81	0.42	1931.44	0	91.81	1.39	25.77	0	
8/15	12	X	0	149.81	0.14	1931.58	0	91.81	35.69	61.46	0	
8/16	12	X	0	149.81	0	1931.58	0	91.81	40	101.46	0	
8/17	12	X	0	149.81	0	1931.58	0	91.81	20.07	121.53	0	
8/24	12	X	0	149.81	0	1931.58	0	91.81	16.67	138.2	0	
8/25	12	X	0	149.81	0	1931.58	0	91.81	16.67	154.87	0	
8/27	12	X	0	149.81	0	1931.58	0	91.81	0.83	155.7	0	
8/28	12	X	0	149.81	0	1931.58	0	91.81	0.28	155.98	0	
8/29	12	X	0	149.81	0	1931.58	0	91.81	0.81	156.79	0	

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

TUNTUTULIAK

	LOC			KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6	>6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/2	1		X	26.92	26.92		0		0				
6/3	1		X	2.67	29.59	0	0	0	0	0	0	0	
6/4	1		X	3.41	33	0.07	0.07		0		0		
6/6	1		X	3.33	36.33	1.25	1.32	0.5	0.5		0		
6/8	1		X	27.17	63.5	17.11	18.43	0.27	0.77		0		
6/9	1		X	87.19	150.69	13.76	32.19	1.92	2.69		0		
6/10	1		X	34.64	185.33	5.65	37.84	1.95	4.64		0		
6/13	1		X	23.48	208.81	6.15	43.99		4.64		0		
6/14	1		X	46.08	254.89	12.08	56.07	2.67	7.31		0		
6/15	1		X	26.52	281.41	6.51	62.58	0.4	7.71		0		
6/17	1		X	4	285.41	0	62.58	0	7.71		0		
6/18	1		X	14	299.41	6	68.58	0	7.71		0		
6/21	1		X	16.98	316.39	83.31	151.89	4.46	12.17		0		
6/22	1		X	24	340.39	6.4	158.29	6.4	18.57		0		
6/23	1		X	26	366.39	3.33	161.62	0.5	19.07		0		
6/25	1		X	17.5	383.89	7.73	169.35	2.63	21.7		0		
6/27	1		X	8.57	392.46	17.14	186.49	9.14	30.84		0		
6/30	1		X	0	392.46	228	414.49	4	34.84		0		
7/7	1		X	4	396.46	88	502.49	2	36.84	0	0		
8/11	1		X	0	396.46	0	502.49	0	36.84	46.67	46.67	0	

TUNTUTULIAK FISH CAMP

	LOC			KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6	>6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/3	2		X	9.23	9.23	0.1	0.1	0.08	0.08				
6/6	2		X	4.5	13.73		0.1		0.08				
6/8	2		X	8.83	22.56	0.08	0.18	0.08	0.16				
6/9	2		X	13.66	36.22		0.18	0.08	0.24				
6/10	2		X	6.14	42.36	0.22	0.4	0.33	0.57				
6/13	2		X	2.5	44.86		0.4	0.17	0.74				
6/14	2		X	13.24	58.1	3.38	3.78		0.74				
6/15	2		X	42.28	100.38	8.47	12.25	0	0.74				
6/17	2		X	11.6	111.98	2	14.25	0.4	1.14				
6/21	2		X	27.43	139.41	6.86	21.11	4.57	5.71				
6/27	2		X	18	157.41	0	21.11	12	17.71				

NAPAKIAK

	LOC			KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6	>6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/4	3		X	0.72	0.72		0		0				
6/6	3		X	1.49	2.21		0		0				
6/7	3		X	1.41	3.62		0		0				
6/8	3		X	1.41	5.03		0		0				
6/15	3		X	10.39	15.42	3.11	3.11	0.5	0.5				
6/17	3		X	19.9	35.32	2.27	5.38	1.58	2.08				
6/18	3		X	30.7	66.02	2.63	8.01	0	2.08				
6/21	3		X	17.93	83.95	18.47	26.48	3.53	5.61				
6/22	3		X	22.17	106.12	29.64	56.12	6.53	12.14				
6/23	3		X	2.33	108.45	5	61.12	0.17	12.31				
6/25	3		X	15.11	123.56	11.56	72.68	4.44	16.75				
6/27	3		X	23.33	146.89	19.33	92.01	9.33	26.08				
7/6	3		X	11.56	158.45	47.33	139.34	17.78	43.86	0			

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

NAPASKIAK

	LOC			KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6	>6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/1	4		X	0.22	0.22		0		0				
6/2	4		X	0.42	0.64		0		0				
6/3	4		X	6.16	6.8		0		0				
6/6	4		X	2.13	8.93		0		0				
6/7	4		X	11.59	20.52	0.58	0.58		0				
6/8	4		X	31.27	51.79	2.73	3.31	0.8	0.8				
6/9	4		X	23.63	75.42	21.5	24.81		0.8				
6/10	4		X	24.33	99.75	3.17	27.98	0.6	1.4				
6/13	4		X	18.17	117.92	5.02	33	0.02	1.42				
6/14	4		X	15.1	133.02	0.37	33.37	0.37	1.79				
6/15	4		X	14.11	147.13	2.6	35.97	0.8	2.59				
6/17	4		X	37.25	184.38	7.75	43.72	0	2.59				
6/18	4		X	17.93	202.31	8.8	52.52	1.72	4.31				
6/21	4		X	20	222.31	85.5	138.02	6.5	10.81				
6/22	4		X	22	244.31	10	148.02	0	10.81				
6/27	4		X	34	278.31	16	164.02	6	16.81				
6/29	4		X	0.83	279.14	0.17	164.19	0	16.81				
6/30	4		X	1	280.14	0.83	165.02	0	16.81				

NICK O'NICK FISH CAMP

	LOC			KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6	>6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/2	5		X	2.08	2.08		0		0				
6/3	5		X	5.27	7.35	0.4	0.4		0				
6/4	5		X	1.25	8.6	0	0.4	0	0	0		0	
6/6	5		X	9	17.6		0.4		0				
6/7	5		X	13.58	31.18	3.82	4.22	0.13	0.13				
6/8	5		X	17.88	49.06	1.87	6.09	0.1	0.23				
6/9	5		X	19.75	68.81	2.32	8.41		0.23				
6/10	5		X	37.05	105.86	4.63	13.04	0.25	0.48				
6/11	5		X	19.62	125.48	14.22	27.26	3.85	4.33				
6/13	5		X	19.11	144.59	9.65	36.91	1.4	5.73				
6/14	5		X	13.46	158.05	4.13	41.04	0.33	6.06				
6/15	5		X	15.94	173.99	5.58	46.62	0.22	6.28				
6/21	5		X	17.24	191.23	16.54	63.16	3.54	9.82				
6/22	5		X	21.92	213.15	47.42	110.58	2.42	12.24				
6/23	5		X	28.27	241.42	66.73	177.31	6.67	18.91				
6/25	5		X	29.53	270.95	31	208.31	4.8	23.71				
6/27	5		X	18.69	289.64	55.1	263.41	7.41	31.12				
6/29	5		X	11	300.64	11	274.41	0	31.12				
6/30	5		X	20.8	321.44	24	298.41	8.8	39.92				
7/1	5		X	24	345.44	24	322.41	8	47.92				
7/6	5		X	8	353.44	45	367.41	1	48.92	0			
7/7	5		X	3	356.44	15	382.41	0	48.92	0			

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

BETHEL/STEAMBOAT SLOUGH

	LOC			KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6	>6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/2	6		X	9.55	9.55		0		0				
6/3	6		X	46.38	55.93	1.14	1.14		0				
6/4	6		X	35.61	91.54		1.14		0				
6/5	6		X	36.68	128.22		1.14		0				
6/6	6		X	42.4	170.62	0.61	1.75	2.87	2.87				
6/7	6		X	41.79	212.41	1.97	3.72	1.48	4.35				
6/8	6		X	140.7	353.13	6.79	10.51	2.92	7.27				
6/9	6		X	125.5	478.6	20.9	31.41	8.45	15.72				
6/10	6		X	5.83	484.43		31.41	0.42	16.14				
6/11	6		X	97.07	581.5	9.87	41.28	2.93	19.07				
6/12	6		X	127	708.5	61.33	102.61	29.44	48.51				
6/13	6		X	47.26	755.76	14.57	117.18	14.05	62.56				
6/15	6		X	26.67	782.43	18.67	135.85	8	70.56				
6/17	6		X	42.33	824.76	6.67	142.52	0	70.56				
6/18	6		X	61.42	886.18	16.75	159.27	4.58	75.14				
6/19	6		X	23.67	909.85	10	169.27	3.19	78.33				
6/21	6		X	42.97	952.82	31	200.27	0.63	78.96				
6/22	6		X	3	955.82	13.33	213.6	0	78.96				
6/23	6		X	32.89	988.71	10	223.6	1.56	80.52				
6/25	6		X	42.22	1030.93	13.33	236.93	8.89	89.41				
6/26	6		X	6	1036.93	100	336.93	13.33	102.74				
6/27	6		X	450	1486.93	50	386.93	100	202.74				
7/12	6		X	54.55	1541.48	30.3	417.23	6.06	208.8	0			

KWETHLUK Y' FISHCAMP

	LOC			KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6	>6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/6	7		X	4.69	4.69		0	0.16	0.16				
6/7	7		X	4.48	9.17	0.75	0.75		0.16				
6/8	7		X	9.05	18.22	0.84	1.59	0.4	0.56				
6/13	7		X	34.61	52.83	7.11	8.7	16	16.56				
6/14	7		X	11.93	64.76	4.42	13.12	2.76	19.32				
6/15	7		X	2.2	66.96	0	13.12	0	19.32				
6/17	7		X	62.67	129.63	0	13.12	0	19.32				
6/21	7		X	41.6	171.23	1.6	14.72		19.32				
6/22	7		X	18.83	190.06	40.33	55.05	40.06	59.38				
6/23	7		X	0.56	190.62	0	55.05	0	59.38				
6/29	7		X	0	190.62	204	259.05	0	59.38				

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

AKIACHAK

	LOC			KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6	>6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/3	8		X	3.13	3.13		0		0				
6/4	8		X	3.54	6.67		0		0				
6/6	8		X	3.06	9.73		0	0.05	0.05				
6/7	8		X	1.46	11.19		0	0.03	0.08				
6/8	8		X	125.9	137.07	0.17	0.17		0.08				
6/9	8		X	18.3	155.37		0.17		0.08				
6/10	8		X	6.81	162.18	0.21	0.38	0.21	0.29				
6/11	8		X	10.1	172.28	0.28	0.66		0.29				
6/13	8		X	13.9	186.18	1.66	2.32	1.48	1.77				
6/14	8		X	24.33	210.51	6.54	8.86	3.33	5.1				
6/15	8		X	15.77	226.28	5.07	13.93	0.4	5.5				
6/16	8		X	26.64	252.92	8.83	22.76	3.32	8.82				
6/17	8		X	10.37	263.29	2.6	25.36	1.54	10.36				
6/18	8		X	8.85	272.14	0.91	26.27	0.5	10.86				
6/21	8		X	32.76	304.9	64.22	90.49	26.5	37.36				
6/22	8		X	20.95	325.85	42.99	133.48	31.82	69.18				
6/23	8		X	3.33	329.18	15.31	148.79	11.04	80.22				
6/25	8		X	129	458.18	98.33	247.12	53.33	133.55				
6/27	8		X	25.79	483.97	37.72	284.84	28.73	162.28				
6/29	8		X	101.8	585.77	42.22	327.06	9.78	172.06				
6/30	8		X	112	697.77	64	391.06	24	196.06				

AKIAK

	LOC			KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6	>6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/6	9		X	2.94	2.94	0.33	0.33		0				
6/7	9		X	4.06	7	0.17	0.5		0				
6/8	9		X	7.02	14.02	1.4	1.9	0.17	0.17				
6/9	9		X	5.69	19.71	5.36	7.26	0.76	0.93				
6/10	9		X	16.14	35.85	3.06	10.32	0.54	1.47				
6/13	9		X	14.38	50.23	6.59	16.91	0.77	2.24				
6/14	9		X	24.79	75.02	2.4	19.31	1.32	3.56				
6/15	9		X	11.53	86.55	0.69	20	0	3.56				
6/16	9		X	0.75	87.3	2.09	22.09	0.17	3.73				
6/17	9		X	20.82	108.12	5.29	27.38	0	3.73				
6/18	9		X	15.06	123.18	0.52	27.9	0	3.73				
6/21	9		X	15.89	139.07	2.99	30.89	0.63	4.36				
6/22	9		X	32.82	171.89	11.83	42.72	3.63	7.99				
6/23	9		X	14.17	186.06	5.83	48.55	1.25	9.24				
6/27	9		X	13.33	199.39	9.25	57.8	0	9.24				
6/29	9		X	14.7	214.09	24.81	82.61	0	9.24				

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

TULUKSAK

	LOC			KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6	>6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/6	10		X	0.44	0.44	0	0		0		0		
6/7	10		X	0	0.44	0.89	0.89	0	0	0	0	0	
6/8	10		X	2.04	2.48		0.89		0		0		
6/9	10		X		2.48		0.89		0		0		
6/10	10		X	3.93	6.41	2.65	3.54		0		0		
6/11	10		X	7.13	13.54	14	17.54		0		0		
6/13	10		X	11.78	25.32	3.77	21.31		0		0		
6/15	10		X	15.56	40.88	1.11	22.42	0	0		0		
6/17	10		X	26.85	67.73	4.19	26.61	0.03	0.03		0		
6/18	10		X	20.22	87.95	3.88	30.49	0.83	0.86		0		
6/20	10		X	18.89	106.84	7.41	37.9	0	0.86		0		
6/21	10		X	24	130.84	14.67	52.57	0	0.86		0		
6/23	10		X	31	161.84	15	67.57	0	0.86		0		
7/26	10		X	0	161.84	70.59	138.16	164.7	165.57	23.53	23.53	0	

KALSKAG

	LOC			KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6	>6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/9	11		X	6	6	3.77							
6/10	11		X	1	7	0.12							
6/11	11		X	1.6		0.05							
6/12	11		X	2.8		1.78		0.71					
6/13	11		X	2.54		11.77		2.67					
6/15	11		X	25.5		7.5		0					
6/17	11		X	28.57		12.38		0					
6/19	11		X	24.29		4.29		0					
6/20	11		X	18.89		27.51		0					
6/21	11		X	17.63		43.84		0					
6/22	11		X	3.25		2.42		0					
6/23	11		X	15.15		171.2		0					
6/24	11		X	3.75		8.33		0					
6/27	11		X	20		42.86		0					
7/1	11		X	25.71		28.57		0		0			

CHUATHBALUK

	LOC			KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6	>6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/21	12		X	3.75		0.28		0					

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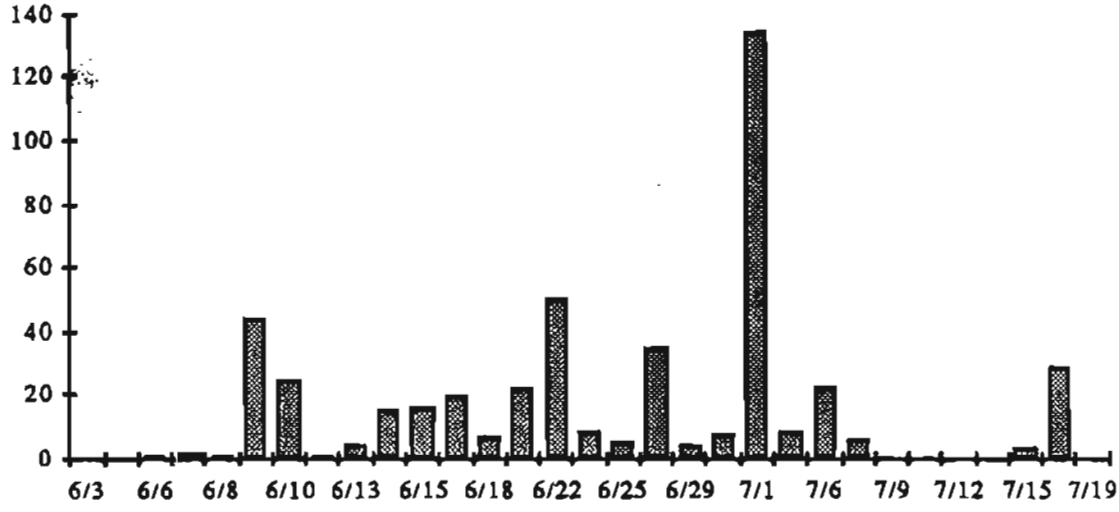

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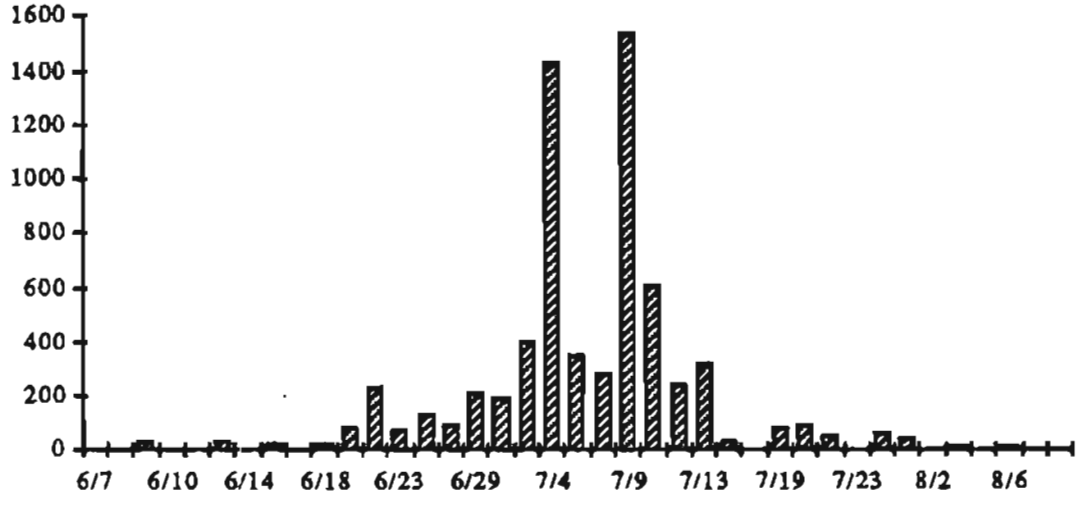

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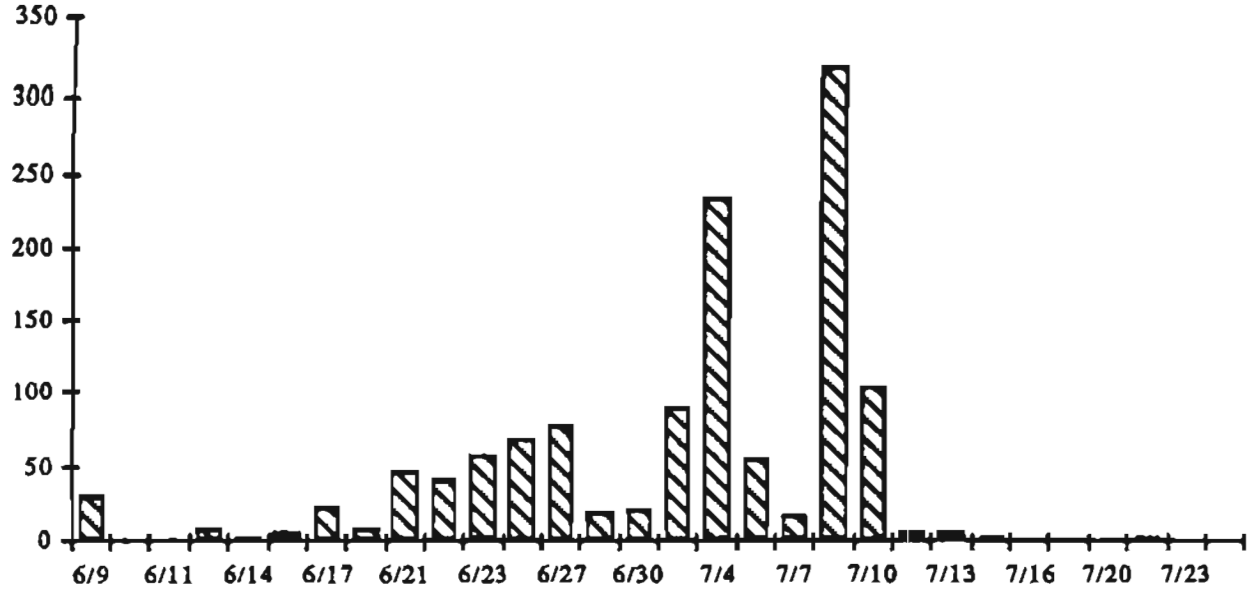

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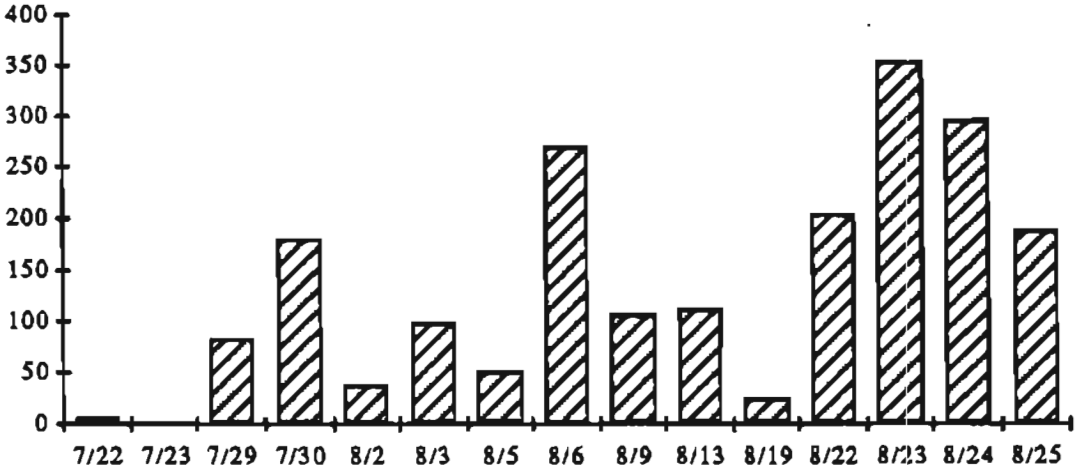

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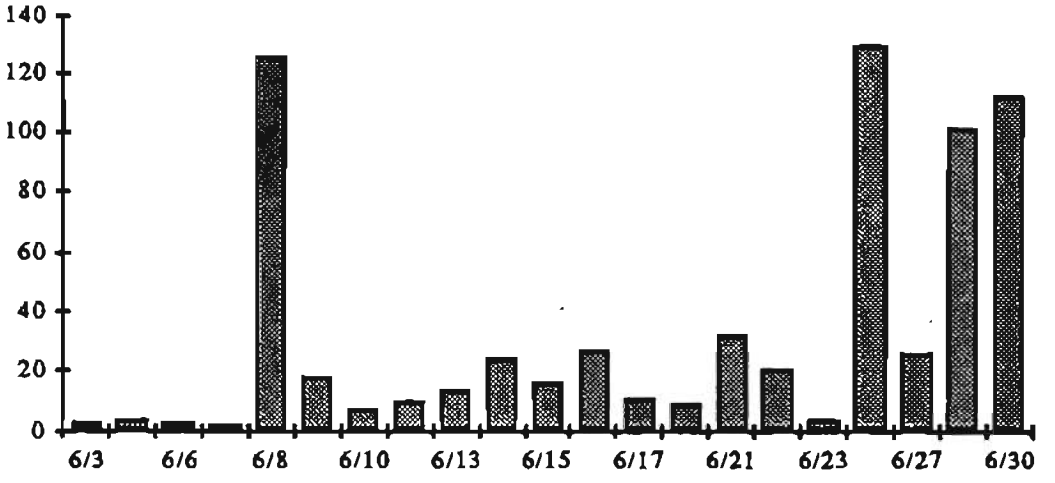

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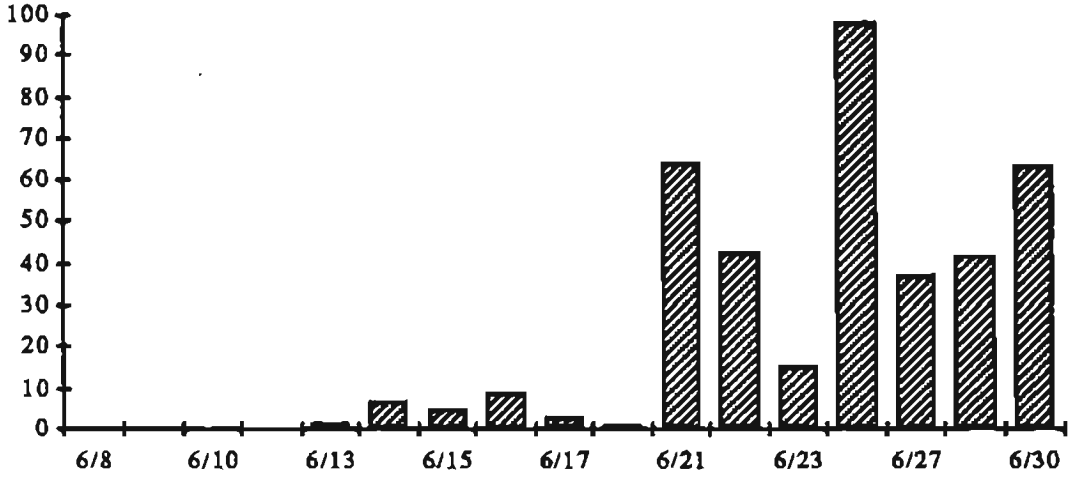

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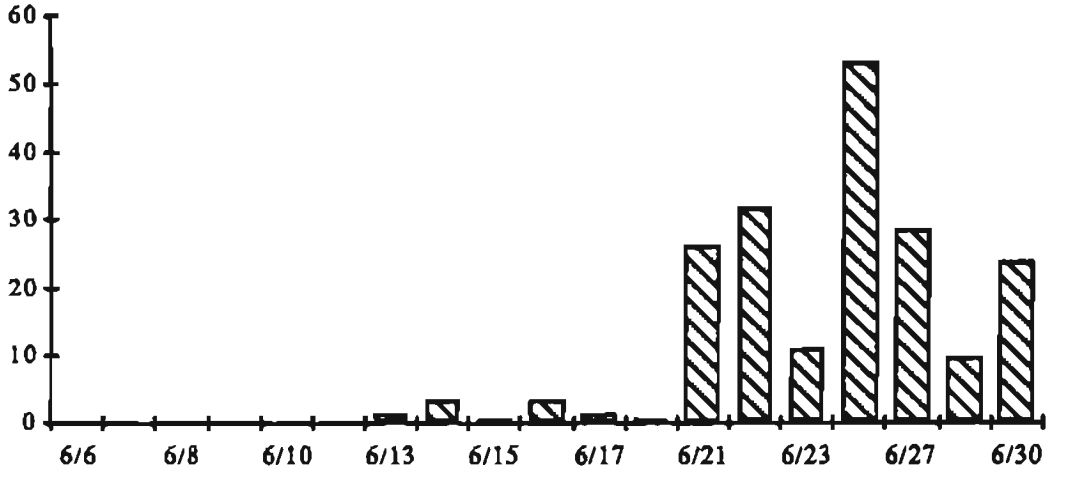

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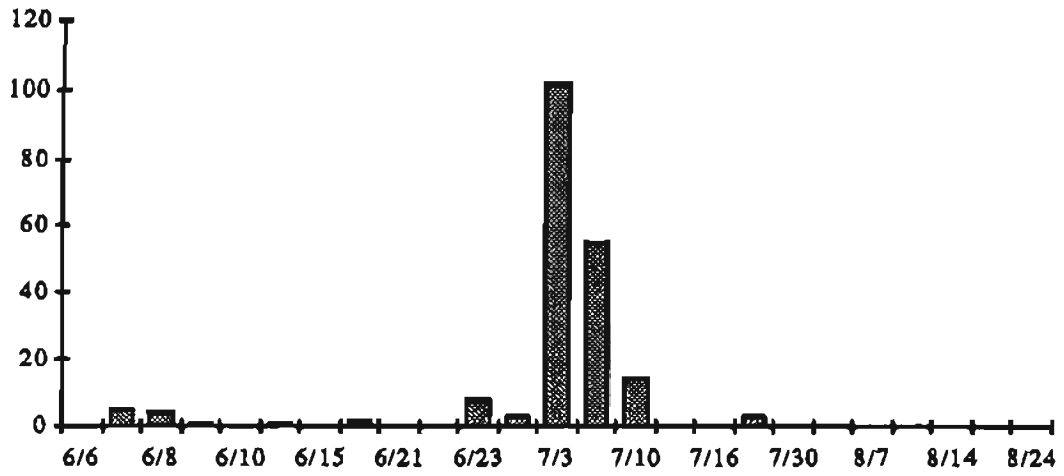

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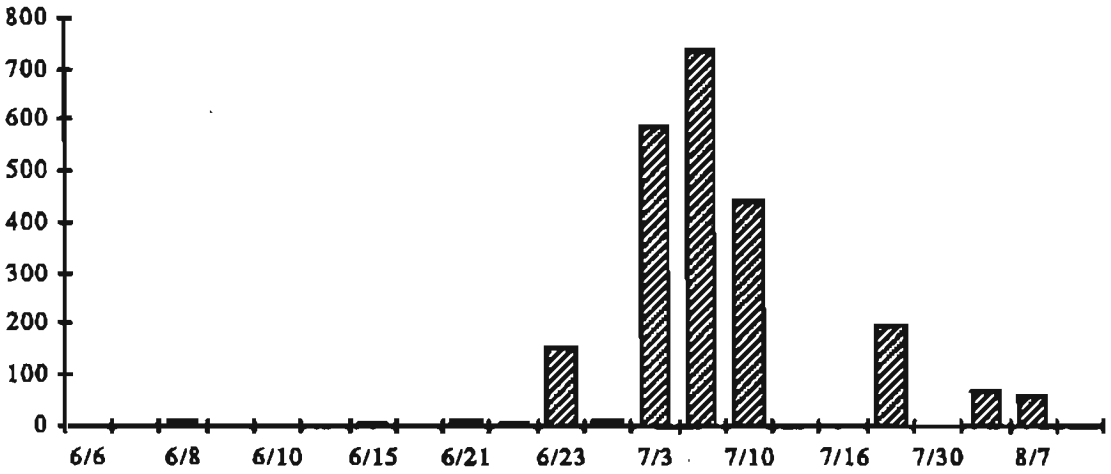

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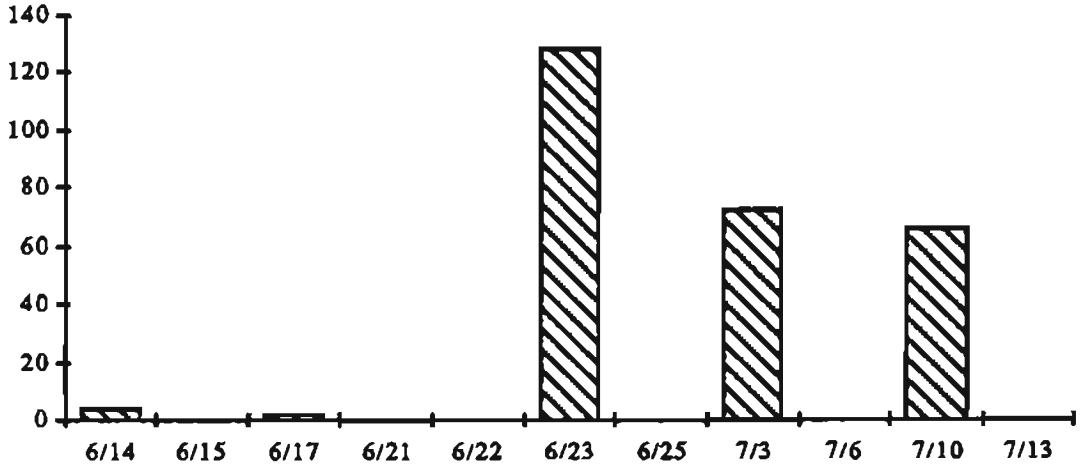

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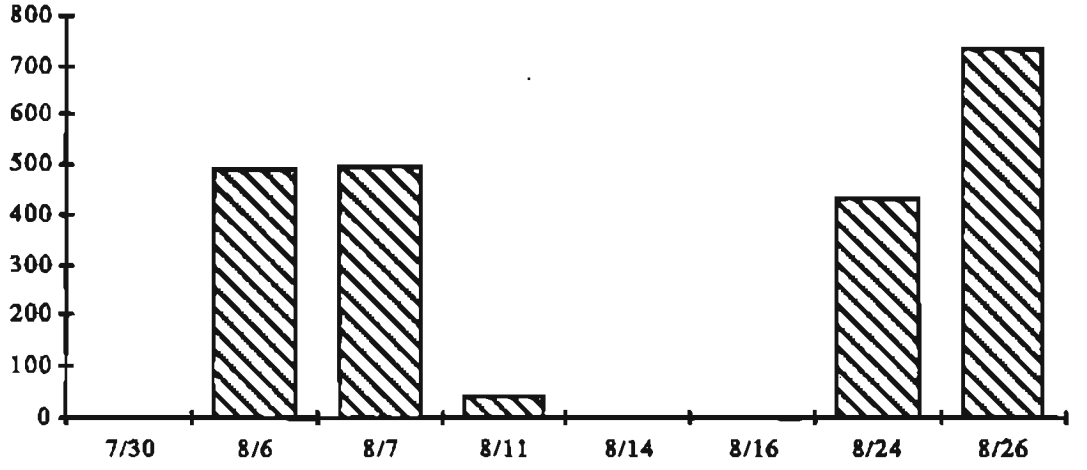

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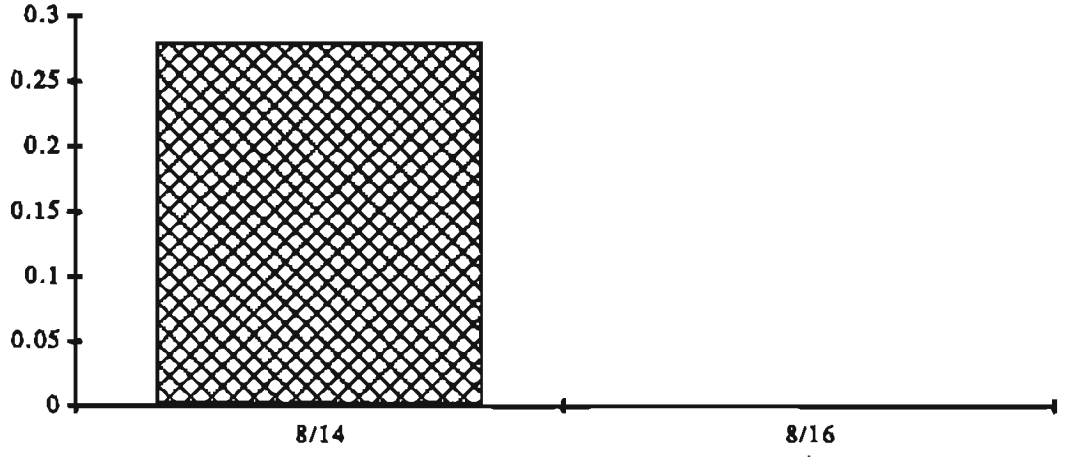

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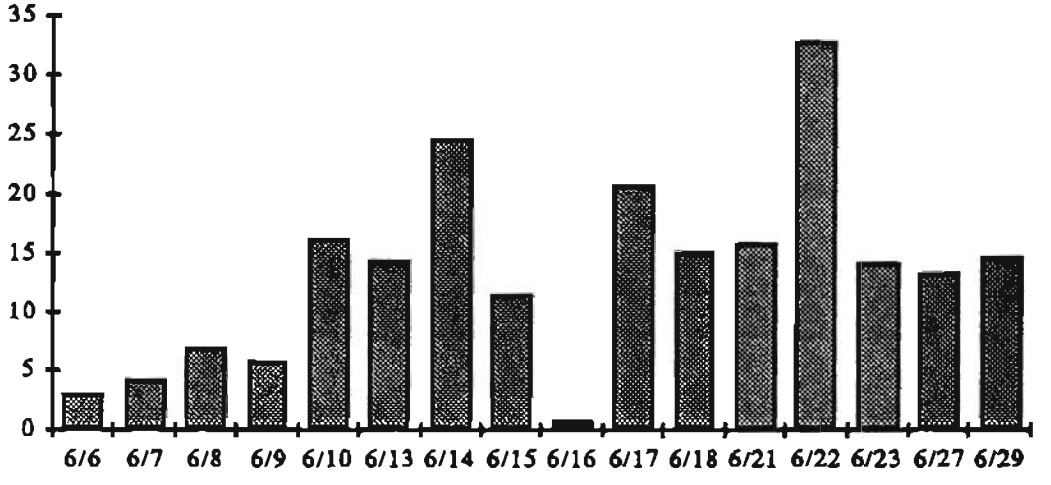

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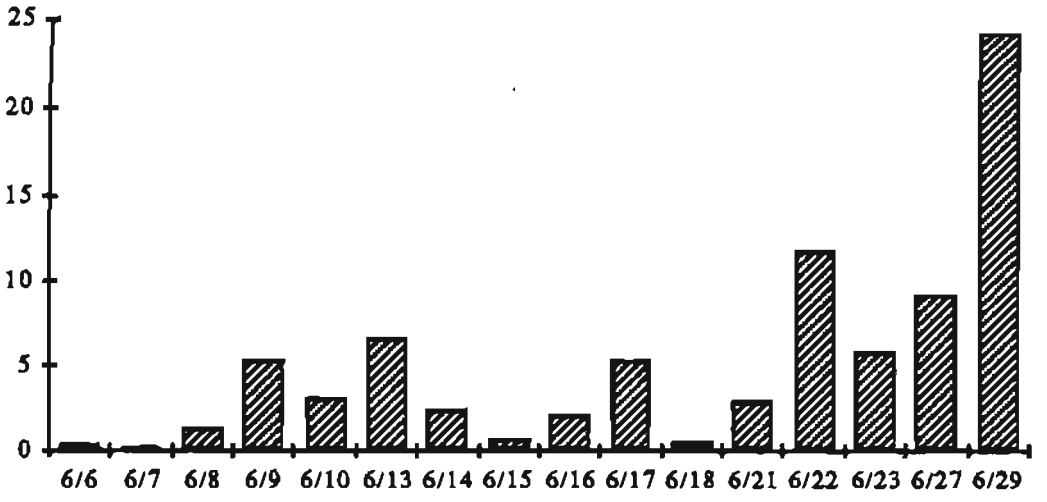

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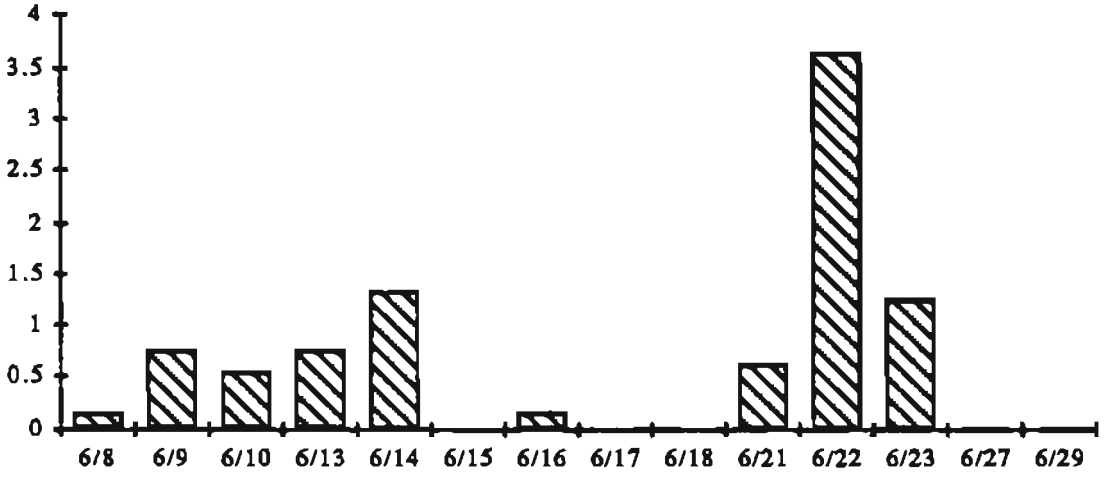

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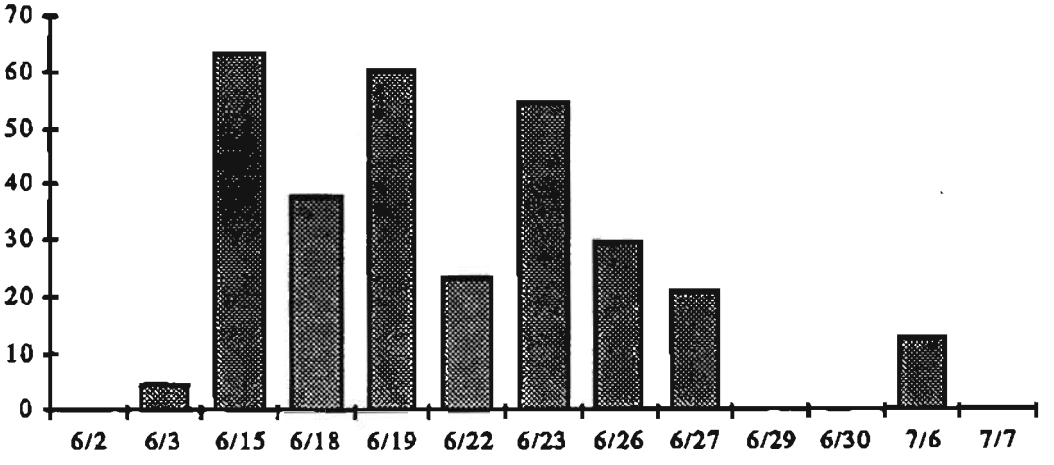

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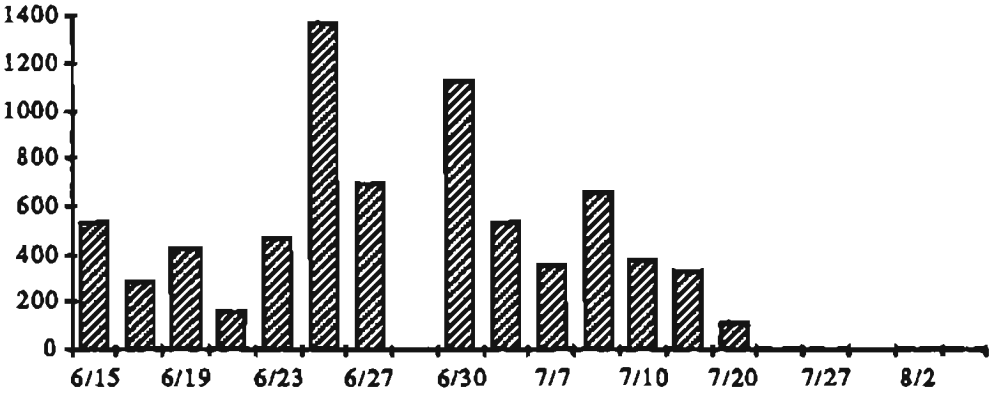

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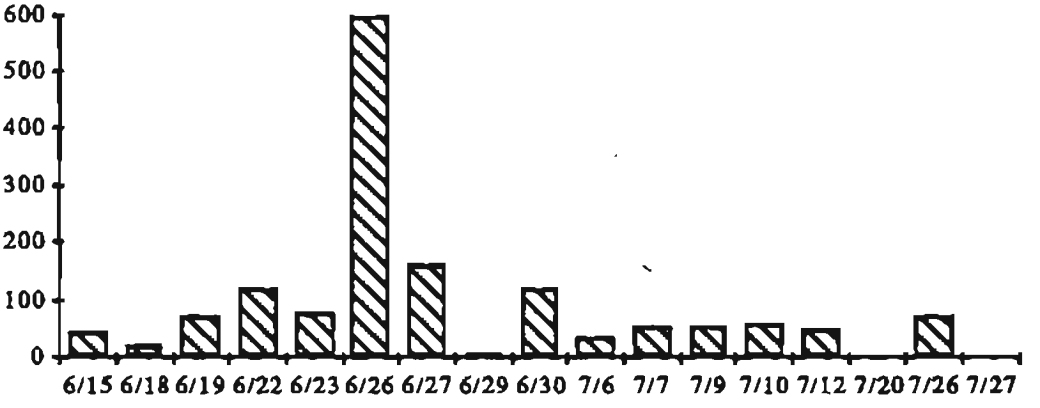

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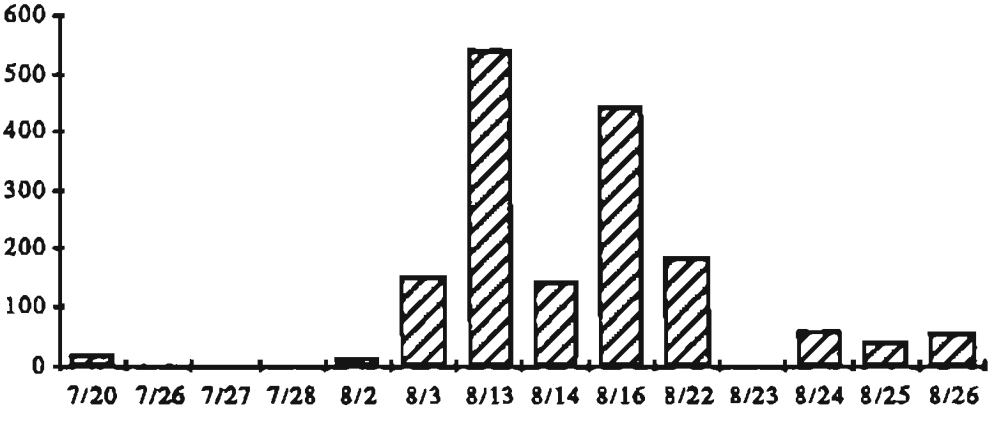

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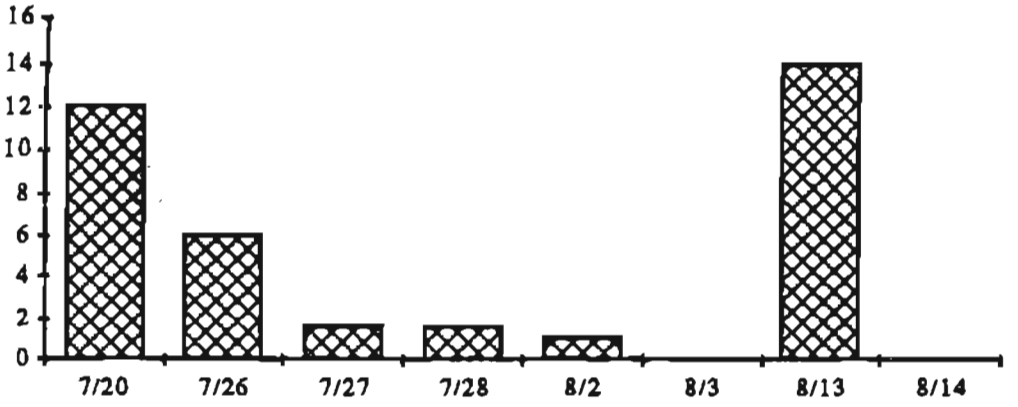

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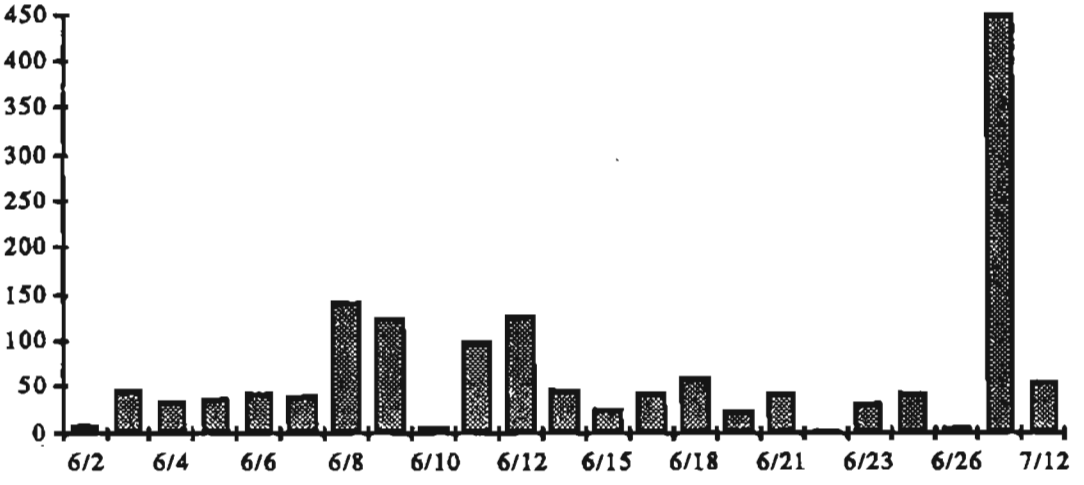

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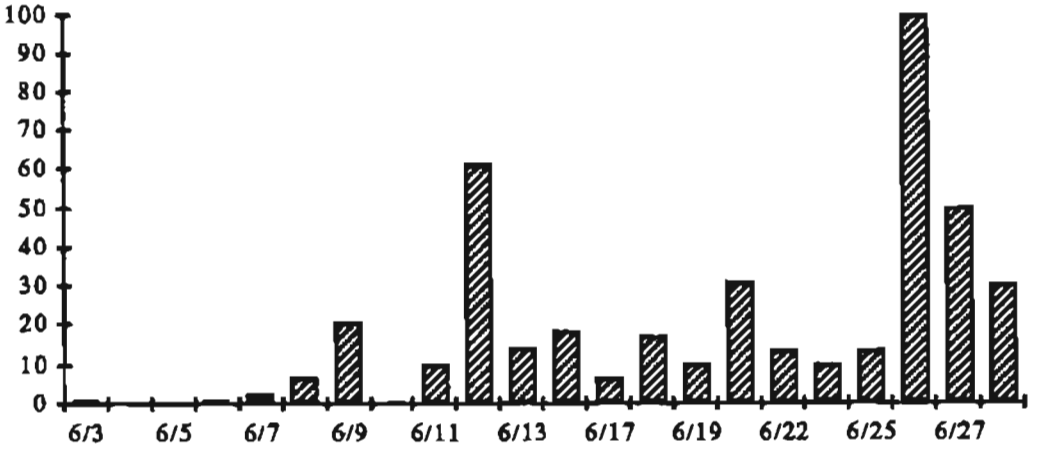

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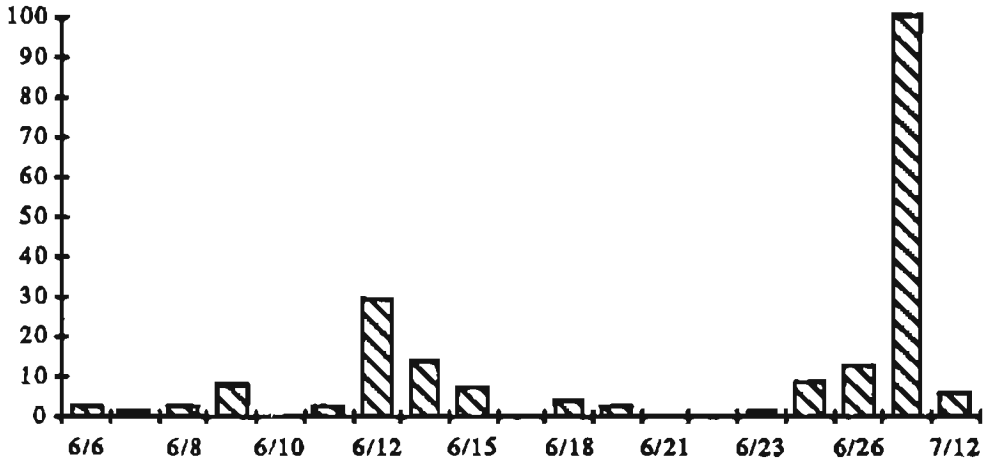

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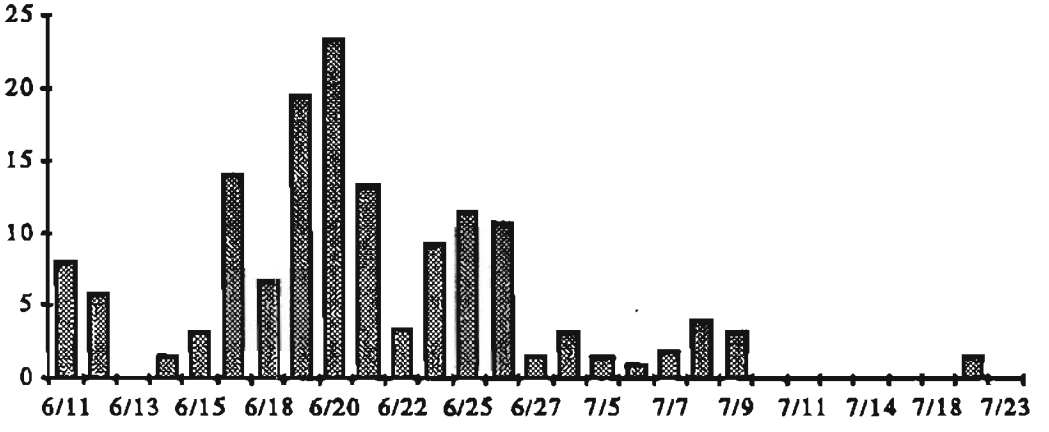

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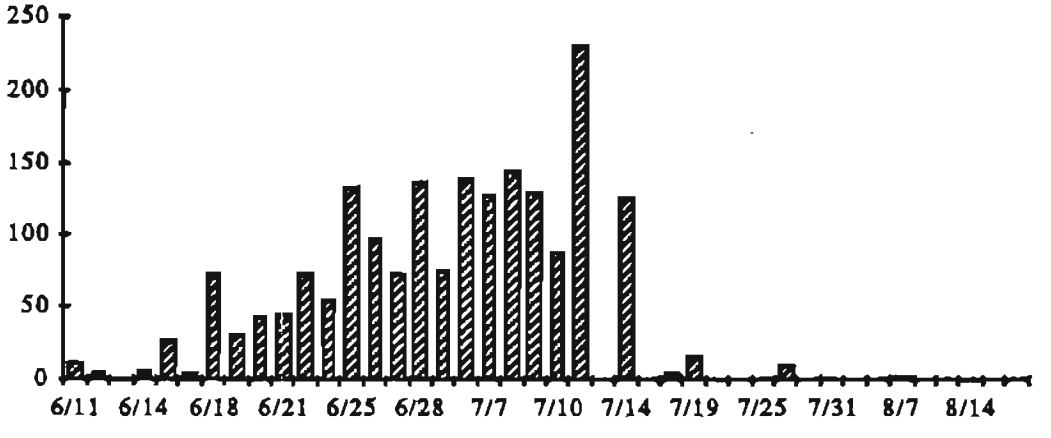

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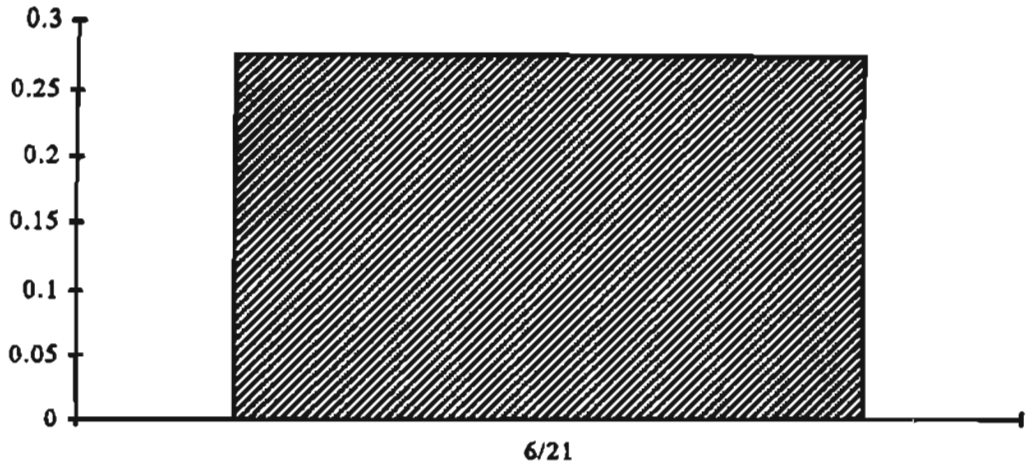

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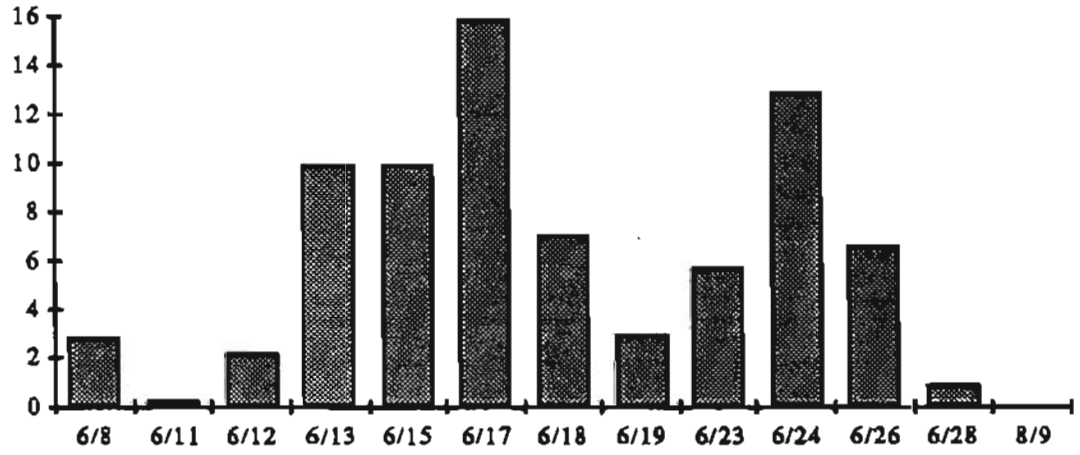

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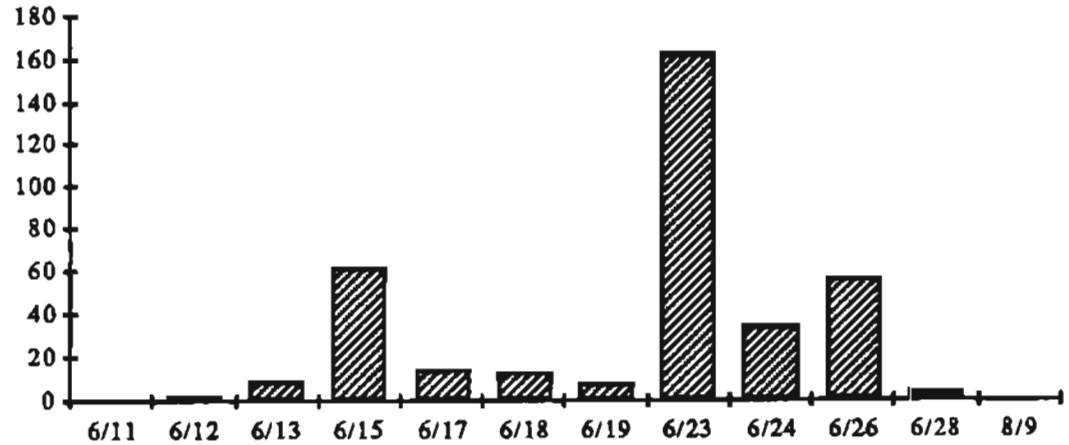

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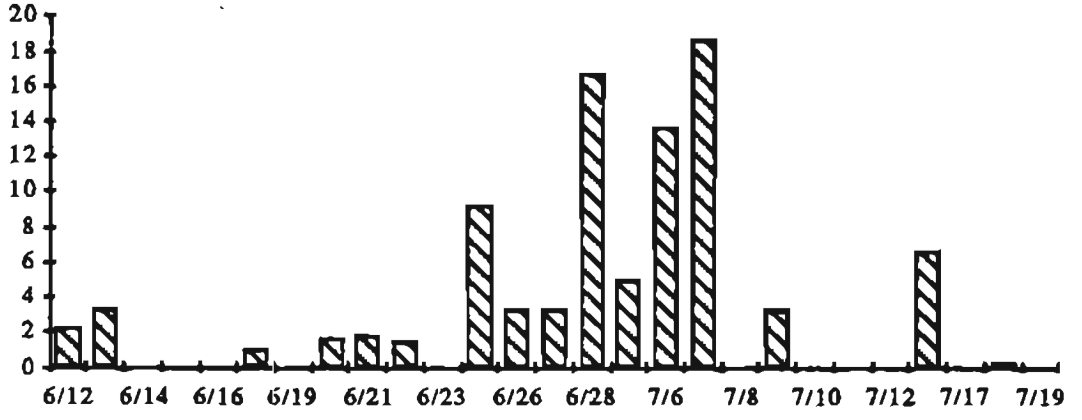

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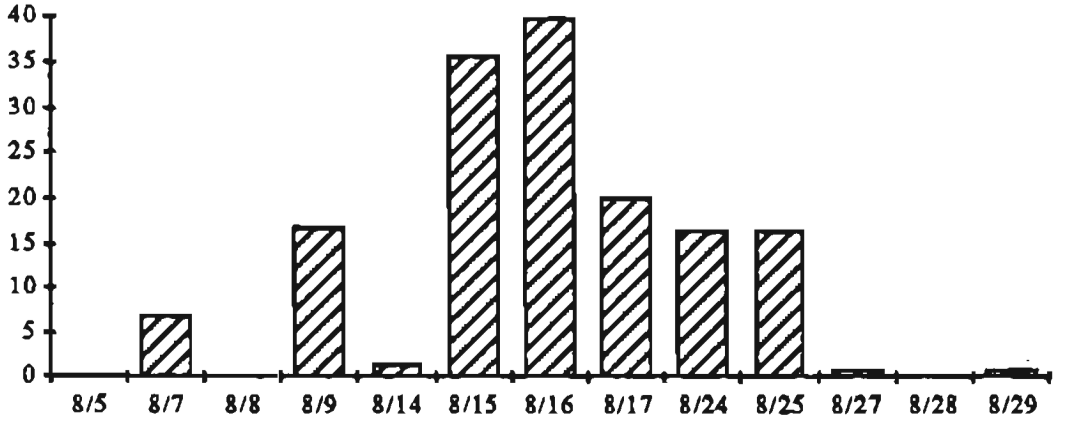

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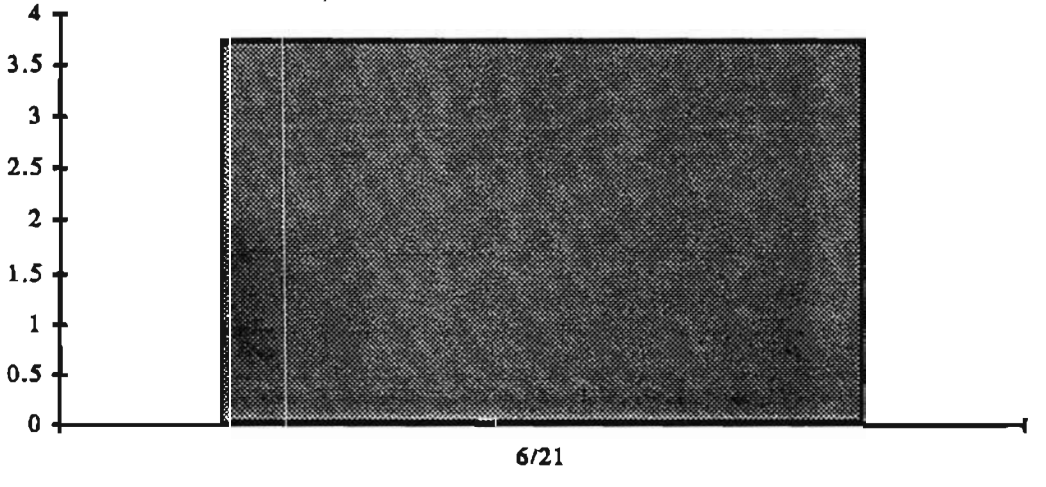

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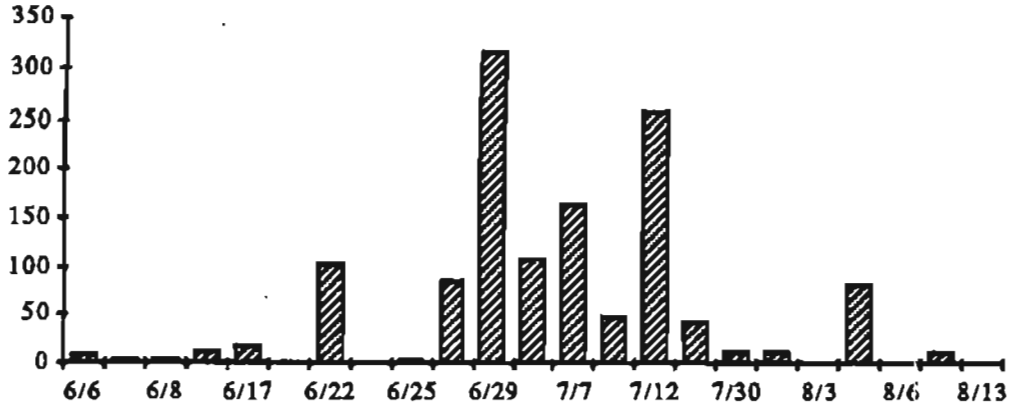

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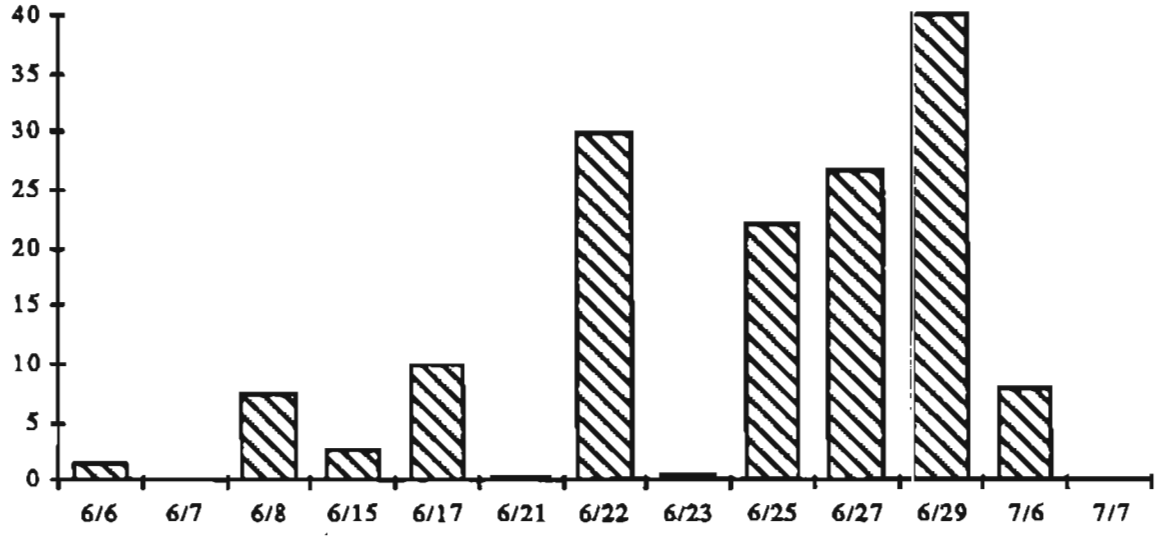

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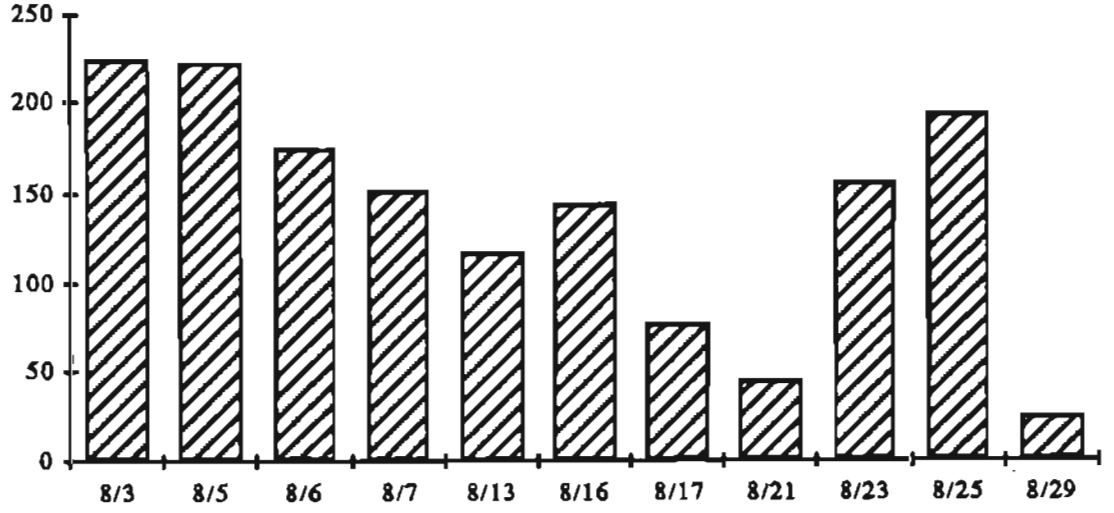

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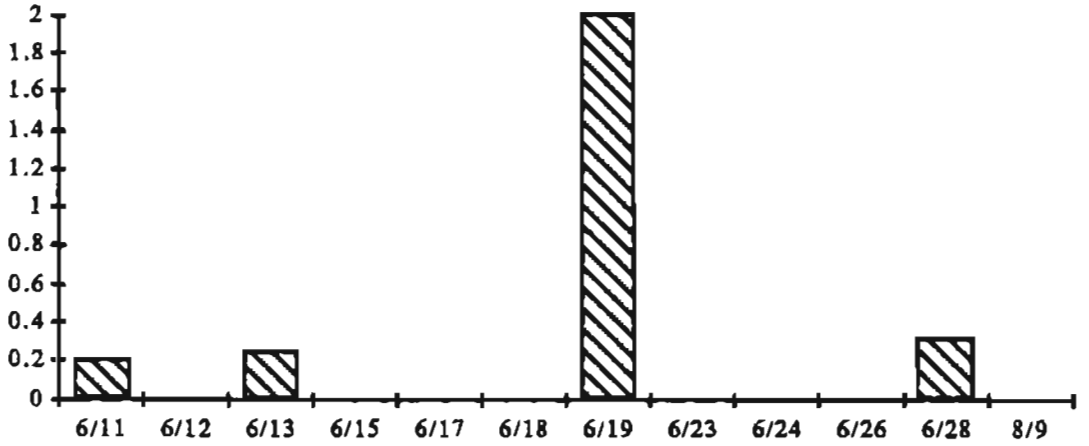

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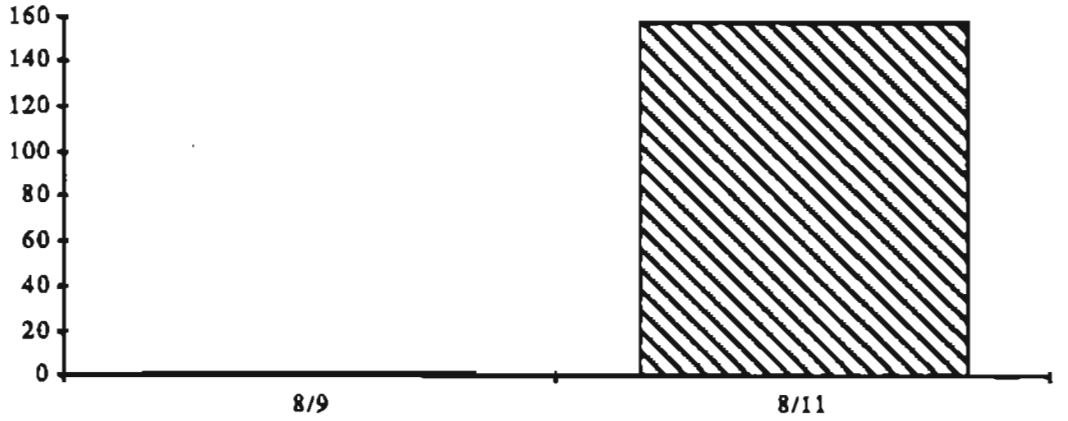

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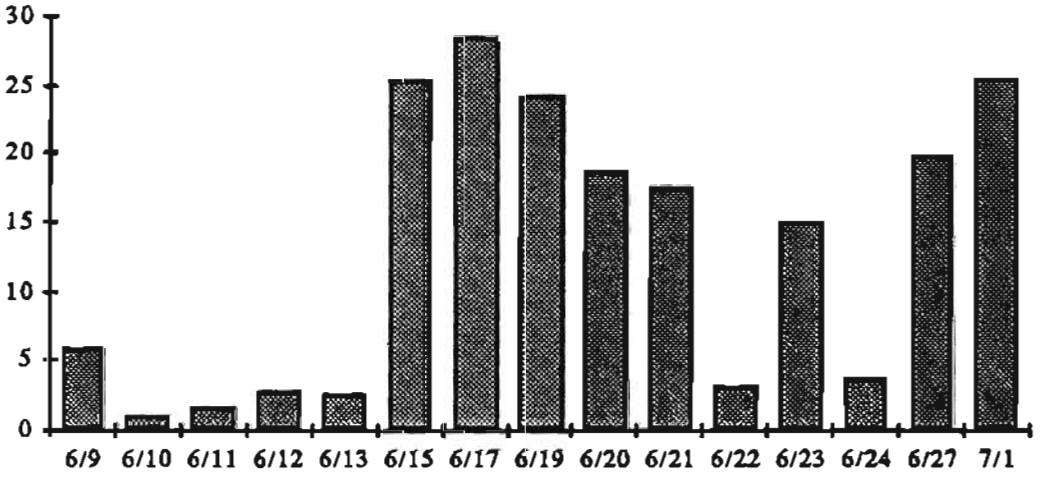

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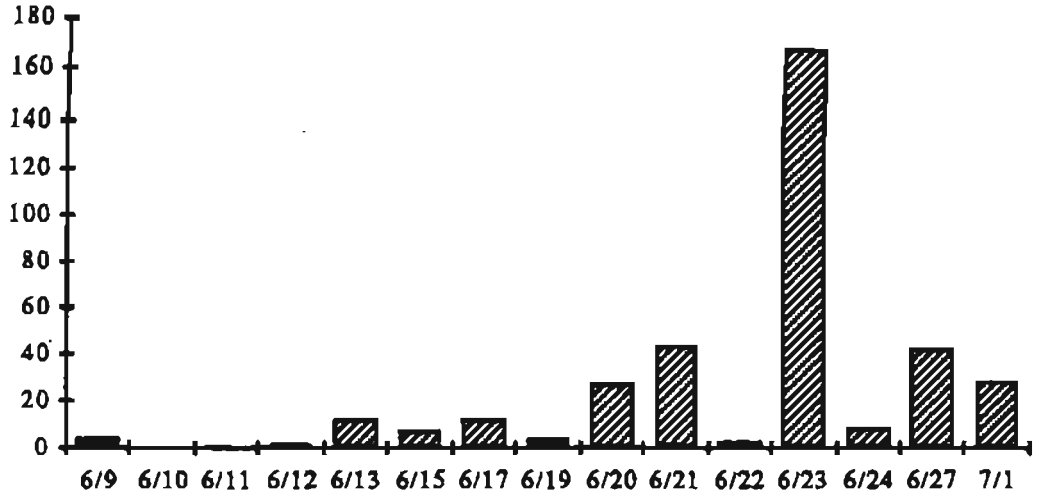

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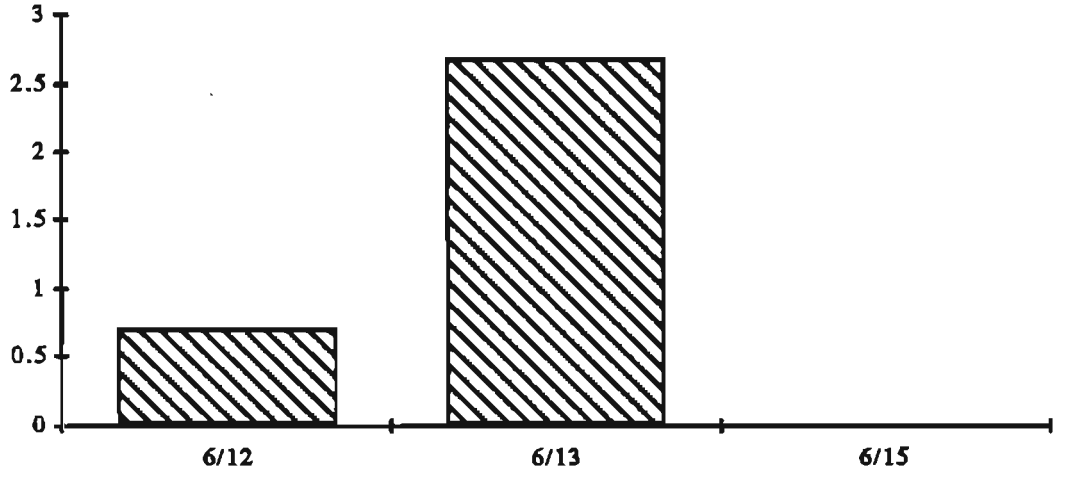

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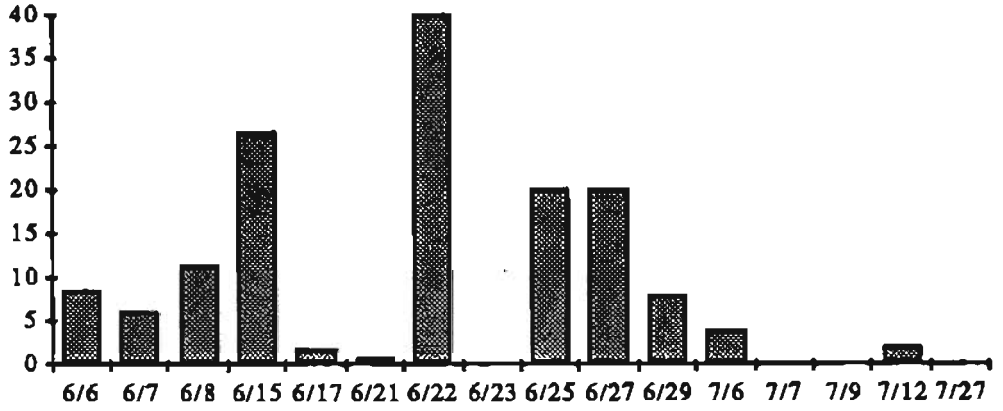

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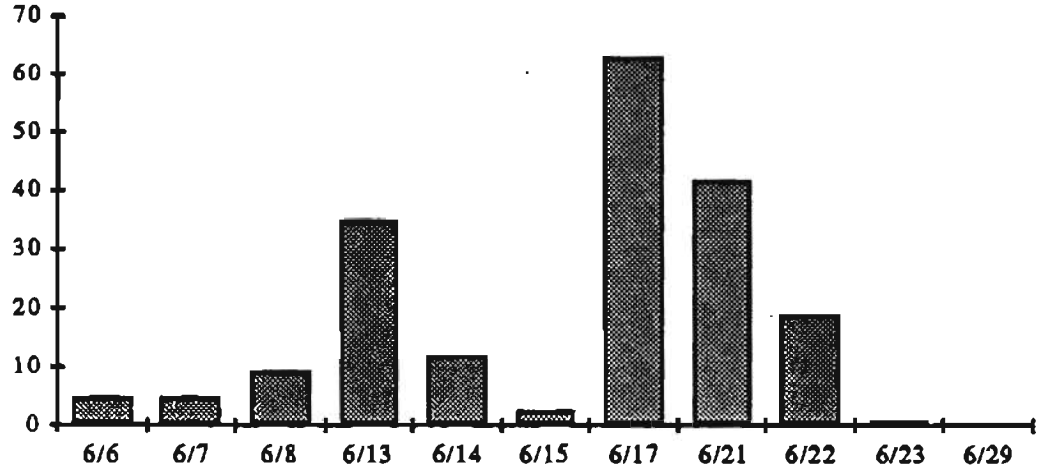

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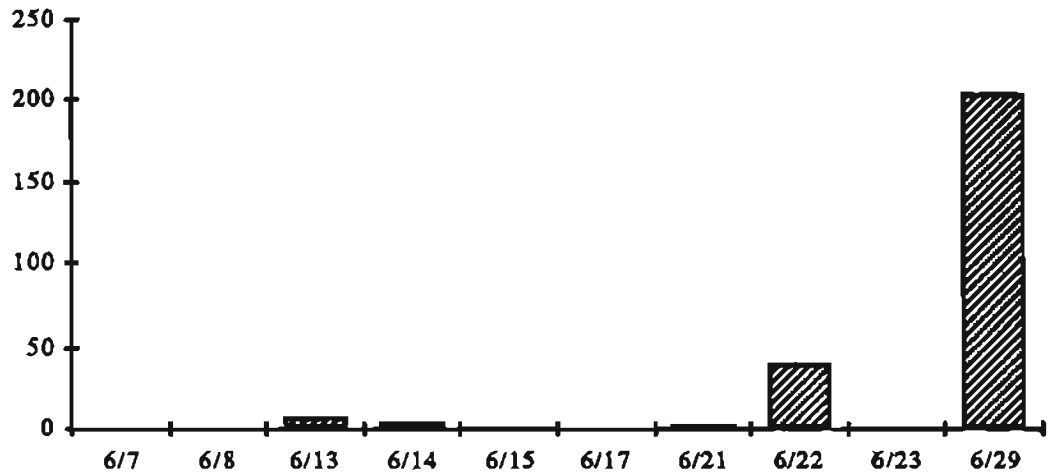

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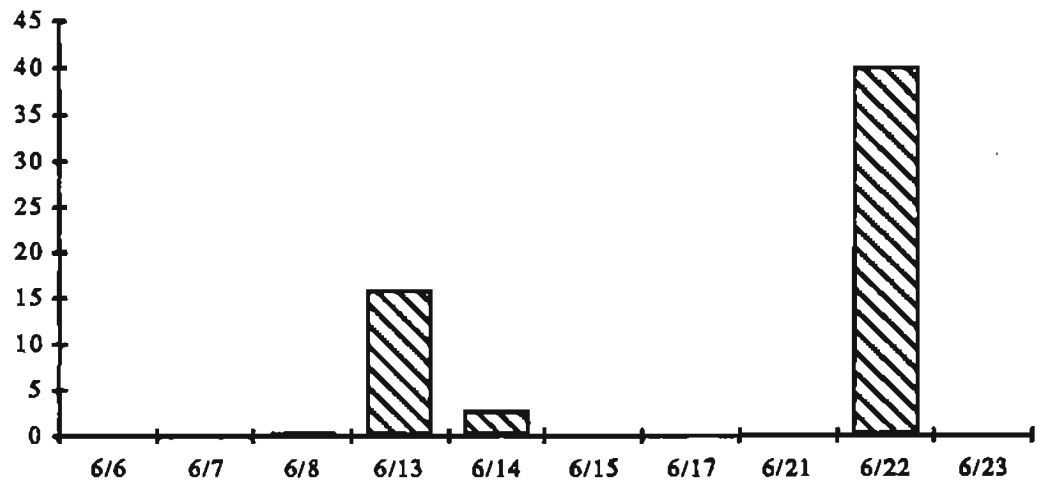

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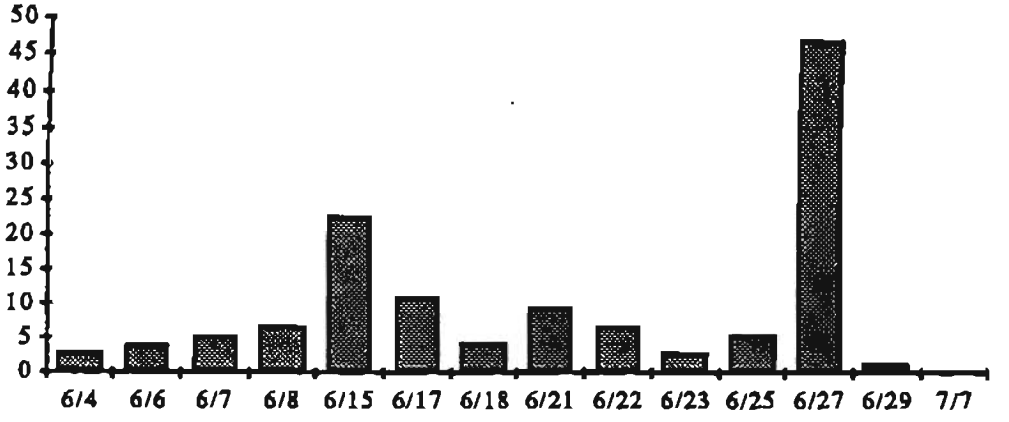

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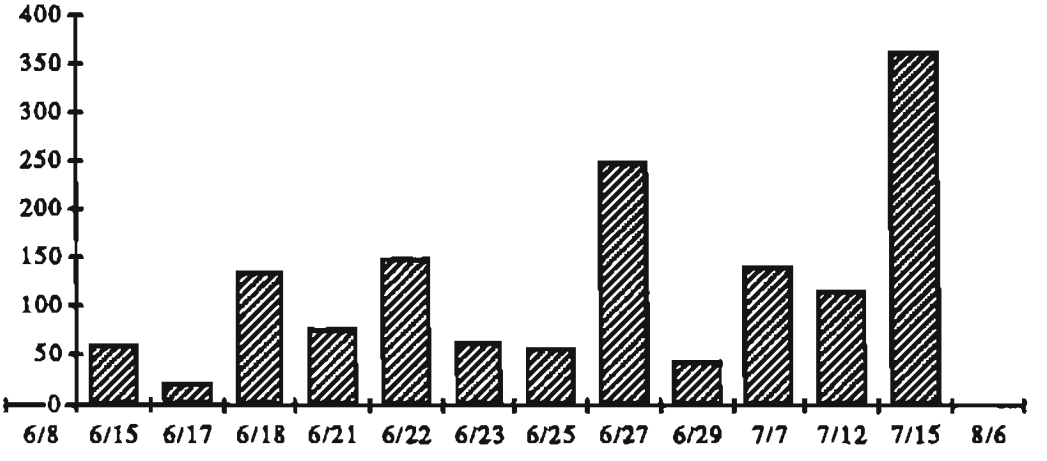

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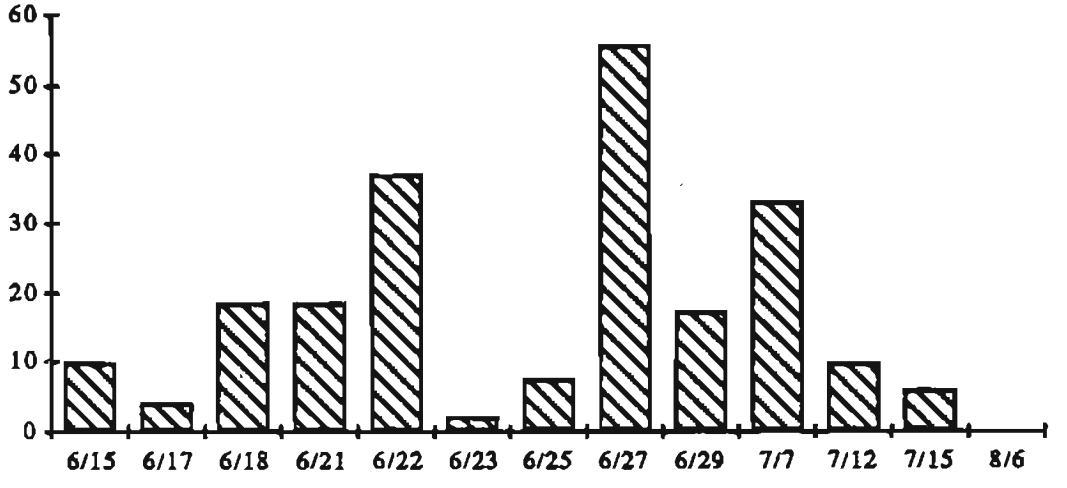

PREFACE

The Commercial Fisheries Division of the Alaska Department of Fish and Game (ADF&G) has estimated subsistence salmon harvests along the Kuskokwim River on a post-season basis since statehood. In recent years limited funding has resulted in a reduced or eliminated subsistence harvest survey program. However, prior to the 1988 season funding became available to conduct both an in-season monitoring and a post-season survey project. The in-season monitoring project was intended to provide information to ADF&G and to the Kuskokwim River Salmon Working Group on 1) whether local subsistence salmon harvest needs were being met for the current season, and 2) the general timing and abundance of the salmon returns. Due to limited staff available to supervise this project, it was decided to contract the work to the private sector. The contract was awarded to the Kuskokwim Fishermen's Cooperative (KFC) under a competitive bid procedure.

The report which follows is an unedited copy of the report prepared by the KFC as submitted to ADF&G in September 1988. In addition there are three attachments that were not part of the original report. They are:

Attachment A: Map of the study area prepared by ADF&G staff.

Attachment B: Letter from ADF&G to KFC regarding review comments on report as submitted. Note that a revised draft was not prepared.

Attachment C: Memorandum from Robert Conrad to Rich Randall regarding recommendations for the 1989 study based on the 1988 results.

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE SURVEY FINAL REPORT 1988

General Description

The Alaska Board of Fisheries established a Kuskokwim River Salmon Working Group to provide inseason coordination with the Department of Fish and Game's Commercial Fisheries Division in Bethel. This group is made up of representatives of the various fishing interests on the Kuskokwim. The primary purpose for this group is to provide input during the commerical fishery into the department's salmon management program utilizing data collected inseason on subsistence catches for specified sections on the river; test fishery data; escapement data; prior year data.

The work group established a subsistence salmon survey program to facilitate collection and preparation of inseason subsistence data as a component of the Kuskokwim River Salmon Management Plan. This program provides the working group an up to date status of subsistence harvests from a sample of fishermen from twelve different locations along the river during the months of June, July, and August. Data collected from this survey is used to evaluate trends in subsistence catches during the commercial salmon fishing season. This assists the work group in determining relative magnitude and timing of salmon runs for purposes of establishing commercial fishing periods.

In order for this project to be implemented successfully the work group required an organization with the resources and familiarity with the subsistence fishery and the people along the Kuskokwim river. This project also had to start right away in June 1988 in order to provide adequate coverage for the enitre fishing season. The Kuskokwim Fishermen's Cooperative was selected to perform this task. A Subsistence Survey Coordinator was hired in the latter part of May to identify survey monitors from each reporting sector, establish a radio and telephone communications network, prepare data collection forms and a data management program on computer. In addition a survey data entry clerk was hired in June to assist in entering data and preparing reports. The survey project operated in the Kuskokwim Fishermen's Cooperative offices at 751 6th Avenue in Bethel.

Survey Locations & Demographics

For the 1988 season the Kuskokwim was divided into twelve sections beginning from the mouth of the river on up to Chuathbaluk. Survey monitors were selected from the following:

Location #	Village/Fish camp
1	Tuntutuliak;
2	Tuntutuliak fish camp near the mouth of the Johnson river;
3	Napakiak;
4	Napaskiak;
5	Nick O' Nick's fish camp just above Oscarville;
6	Bethel to collect harvest by fish camps along Steamboat Slough near Bethel;
7	Kwethluk Y' fish camp;
8	Akiachak;
9	Akiak;
10	Tuluksak;
11	Kalskag;
12	Chuathbaluk.

Chuathbaluk is located in the middle Kuskokwim river area 160 miles above Bethel with a population of 100 or more. Of that, about 7 families are included in the report. Upper and Lower Kalskag is located 100 miles above Bethel with a combined population of around 438. Reports were primarily from the few fishcamps near Kalskag. Tuluksak population is near 350. About 23 families from Tuluksak were included in the reports this summer. Akiachak consists of about 451 and about 10 families' catch were reported. Akiak has an estimated population of 300 and 24 families were included in the reporting this summer. Kwethluk has a population of 538 and 10 families catch were reported. Reports from Kwethluk came primarily from a fish camp resident near the Y' below Kwethluk. Bethel has a population of about 4,462 and 17 families were surveyed from Bethel and from fish camps in the Steamboat slough. Nick O'Nick fish camp is located below Bethel near Oscarville. 39 families were reported from that and other nearby fish camps between Nick's fish camp and Bethel. Napaskiak has a population of 324 and estimated 33 families were included in the reports. Napakiak is located about 6 and a half miles below Bethel with a population of 320 and 47 families were surveyed. 13 families were surveyed from Tuntutuliak fish camp. Tuntutuliak fish camp is located about fourteen miles below Bethel. Tuntutuliak has a population of 292. Catches from 30 fishermen from Tuntutuliak were included in the reports.

Survey Monitoring & Reporting

Monitors would survey each contact in person utilizing forms prepared by the survey coordinator. When weather or other circumstances would not permit in-person surveys to fishcamps, contacts were sometimes made by VHF. Reports did not always include all possible contacts from each location. As it was, reports reflected the number of fishermen who reported catches to the survey monitor. There were certain times, especially during silver season, that monitors surveyed their locations but no one was fishing. This is either due to weather or sufficient catches were already made by the surveyed fishermen.

Monitors from villages selected a mix of subsistence fishermen from the villages and surrounding fish camps. The majority of reports came from fishermen residing in fishcamps. Reports concentrated on main stem catches and not on tributary streams. Reports were prepared by the monitors once a day Monday through Friday. The weekend data was reported on Monday. Monday's data was reported on Tuesday and Tuesday's was reported on Wednesday and so on. If a monitor missed one report he/she was contacted by the coordinator the following day. ? The day after a commercial opening monitors would not have to report because subsistence fishing was closed during that period. Monitors reported to the coordinator by phone or on VHF radio. On occassion reports were brought in-person to the coordinator.

Survey Statistical Description

The report provided by the monitors included: the date; fishermen identification number; location; soak time; whether set or drift; mesh size and depth; fathoms of net; and number of fish by species. A fishermen identification number was provided by each monitor to assist in determining consistency of reporting by individual fishermen.

Once collected, the data was then entered into an Apple Macintosh SE computer utilizing a Microsoft Excel program; sorted by date, location, and mesh size (<=6 or >6). The Microsoft Excel worksheets included: fishermen id #; date; location #; whether set or drift; soak time; mesh size; mesh depth; fathoms length of net; number of catch and CPUE by species. The CPUE calculation in the worksheets included the following formula: (6,000 X catch) / (fms net X soak time). Soak time was reported in hours or minutes, but was entered on the worksheets in hours (minutes were entered as a decimal of hours). The CPUE calculation converted the hours into minutes for the formula. After the data was sorted by date and location, a summary calculation was made by the computer utilizing a macro application in Excel. This summary calculation included: the number of fishermen reported; date; location #; mesh size; sum of catch by species; calculation of average of CPUE's reported by species. Up to date printed reports included: raw data with summaries per location; a summary report by location and net size; and by-species charts of each location according to net size. Raw data and summaries were printed on

regular computer paper utilizing a wide carriage dot matrix printer. Charts were then printed on 8 1/2" X 11" paper utilizing a laser printer. Both Microsoft Excel's charting program and Microsoft Word were utilized to prepare the printed charts. These reports were prepared once a week for each of the Kuskokwim River Salmon Work Group meetings which occurred weekly during the season. Included with this report is a table of summary CPUE's with cumulative calculations; charts for each cumulative calculation by mesh size and location; daily charts of CPUE by mesh size and location. Conversion to IBM applications is possible with the Apple Macintosh. The Microsoft Excel program reads and writes Lotus 123 files, it can also prepare data in ASCII format. A Macintosh communications program is available to transfer files to the department's Compaq computers in Bethel.

Evaluation of Data Collection and Outline of Problems

The reporting form and format was simple enough for reporting. Data entry and report preparation was performed utilizing a rather simple to use computer data management system. We plan to improve the report preparation process by writing into the computer program, an application macro that would allow the computer to sort, tabulate, summarize, chart, and then print without a lot of user intervention. This would allow a better use of the Survey Coordinator's time.

Having twelve reporting sections and attempting adequate reporting of data was difficult. There is just too much data to collect and prepare. Because of the time consuming nature of the project we were forced to hire an additional person to perform data entry, help prepare reports, and maintain communications. Twelve monitors is too many to coordinate and attempt to maintain continous communications with. Some did not have a phone or VHF of their own.

There was also a problem with turn-over in some of the monitors. Monitors were also not always available. New survey monitors had to be recruited and trained in a timely manner as was possible. This was time consuming and expensive. The project can still be maintain using as many as six reporting sections rather than twelve. Alternates would also be needed at these locations to keep consistency of reporting information because some monitors went commercial fishing, picking berries, or hunting which delayed reporting.

As for the six locations: Tuntutuliak, Tuntutuliak fish camp, Napaskiak or Nick O'Nick's fish camp, Akiachak or Akiak, Tuluksak or Kalskag, and Chuathbaluk. These locations would provide an adequate number for reporting and efficient management of the survey effort. They are spaced far enough from each other to provide a fair sample of salmon subsistence catches during the commercial season. There are also enough subsistence fishermen in these locations to justify the number of locations for the survey effort.

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

TUNTUTULIAK

	LOC		KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6 >6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/7	1	X	20	20	80	80	0	0	0	0	0	0
6/8	1	X	69.33	89.33	93.33	173.33	0	0	0	0	0	0
6/9	1	X	74.67	164	114.7	288	0	0	0	0	0	0
6/10	1	X	19.5	183.5	1.17	289.17	0	0	0	0		0
6/14	1	X	58.82	242.32	2035	2324.46	105.9	105.88	0	0	0	0
6/18	1	X	9.25	251.57	116.8	2441.21	10.5	116.38	0	0		0
6/21	1	X	4	255.57	126.7	2567.88	0	116.38	0	0		0
6/23	1	X	7.61	263.18	71.4	2639.28	20.07	136.45	0	0		0
6/27	1	X	18.75	281.93	290.6	2929.87	67.07	203.52	0	0		0
6/29	1	X	10.18	292.11	391.8	3321.63	13.33	216.85	0	0		0
6/30	1	X	1	293.11	139	3460.63	6	222.85	0	0		0
7/6	1	X	0	293.11	440	3900.63	8	230.85	0	0		0
7/7	1	X	4	297.11	290	4190.63	12	242.85	0	0		0
7/10	1	X	8	305.11	920	5110.63	40	282.85	0	0		0
7/12	1	X	7.84	312.95	808.2	5918.82	0	282.85	0	0		0
7/13	1	X	0	312.95	100	6018.82	0	282.85	0	0		0
7/15	1	X	2	314.95	115.8	6134.62	0	282.85	0	0		0
7/16	1	X	0	314.95	50	6184.62	0	282.85	0	0		0
7/20	1	X	0	314.95	26.26	6210.88	0	282.85	0	0	0	0
7/22	1	X	0	314.95	100	6310.88	0	282.85	8	8	4	4
7/23	1	X	0	314.95	20	6330.88	0	282.85	4	12	0	4
7/25	1	X	0	314.95	60	6390.88	0	282.85	56	68	8	12
7/30	1	X	0	314.95	16	6406.88	0	282.85	9.33	77.33	0	12
8/2	1	X	0	314.95	0	6406.88	0	282.85	40	117.33	0	12
8/4	1	X	0	314.95	12.12	6419	0	282.85	30.3	147.63	0	12
8/9	1	X	0	314.95	0	6419	0	282.85	46	193.63	0	12
8/16	1	X	0	314.95	0	6419	0	282.85	285.64	479.27	0	12
8/17	1	X	0	314.95	0	6419	0	282.85	456	935.27	0	12
8/22	1	X	0	314.95	0	6419	0	282.85	84	1019.3	4	16
8/24	1	X	0	314.95	0	6419	0	282.85	80	1099.3	0	16
8/29	1	X	0	314.95	0	6419	0	282.85	75	1174.3	0	16

TUNTUTULIAK FISH CAMP

	LOC		KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6 >6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/8	2	X	5	5	22	22	0	0	0	0	0	0
6/10	2	X	29	34	5	27	0	0		0		0
6/14	2	X	5.67	39.67	18	45		0		0		0
6/15	2	X	5.33	45	47	92	6	6		0		0
6/17	2	X	7	52	80	172	5	11		0		0
6/21	2	X	39.09	91.09	883.6	1055.58	74.26	85.26		0		0
6/22	2	X	14	105.09	128	1183.58		85.26		0		0
6/23	2	X	12.09	117.18	178.5	1362.07	2.67	87.93		0		0
6/25	2	X	1	118.18	361	1723.07	0	87.93		0		0
6/27	2	X	3.33	121.51	152.7	1875.74	14.67	102.6		0		0
6/29	2	X	4	125.51	560	2435.74	32	134.6	4	4		0
6/30	2	X	2	127.51	341	2776.74	11	145.6		4		0
7/1	2	X	25	152.51	1700	4476.74	25	170.6		4		0
7/6	2	X	2.92	155.43	173.1	4649.82	2.48	173.08	0	4		0
7/7	2	X	8	163.43	735.4	5385.25	2.38	175.46	20	24		0
7/10	2	X	25	188.43	125	5510.25	0	175.46	0	24		0
7/16	2	X	0	188.43	287.5	5797.75	0	175.46	0	24		0
8/11	2	X	0	188.43	0	5797.75	0	175.46	1400	1424	0	0
8/17	2	X	0	188.43	0	5797.75	0	175.46	140	1564	2	2
8/30	2	X	0	188.43	0	5797.75	0	175.46	430.3	1994.3	0	2

KUSKOKWIM FISHERMEN'S COOPERATIVE
KUSKOKWIM RIVER SALMON MANAGEMENT WORK GROUP
SUBSISTENCE CATCH SUMMARY DATA FORM

NAPAKIAK

	LOC			KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6	>6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/4	3	X		3	3	0	0	0	0	0	0		
6/6	3	X		4	7	0	0	0	0	0	0		
6/7	3	X		5.33	12.33		0		0		0		
6/8	3	X		6.8	19.13	0.4	0.4		0		0		
6/15	3	X		22.67	41.8	59.67	60.07	10	10		0		
6/17	3	X		11.1	52.9	22.72	82.79	4.09	14.09		0		
6/18	3	X		4.33	57.23	134.7	217.46	18.67	32.76		0		
6/21	3	X		9.33	66.56	79	296.46	18.5	51.26		0		
6/22	3	X		6.89	73.45	150.2	446.68	37.06	88.32		0		
6/23	3	X		2.8	76.25	64	510.68	2.13	90.45		0		
6/25	3	X		5.39	81.64	58.5	569.18	7.67	98.12		0		
6/27	3	X		48	129.64	250	819.18	56	154.12		0		
6/29	3	X		1.33	130.97	45.33	864.51	17.33	171.45		0		
7/7	3	X		0	130.97	140.9	1005.4	33.33	204.78	0	0		
7/12	3	X		0	130.97	116	1121.4	10	214.78	0	0		
7/15	3	X		0	130.97	363.6	1485.04	6.06	220.84	0	0		
8/6	3	X		0	130.97	0	1485.04	0	220.84	295.02	295.02	0	
8/17	3	X		0	130.97	0	1485.04	0	220.84	174.86	469.88	0	
8/19	3	X		0	130.97	0	1485.04	0	220.84	132	601.88	0	
8/20	3	X		0	130.97	0	1485.04	0	220.84	121.21	723.09	0	
8/23	3	X		0	130.97	0	1485.04	0	220.84	128.07	851.16	0	
8/28	3	X		0	130.97	0	1485.04	0	220.84	160	1011.2	0	
8/29	3	X		0	130.97	0	1485.04	0	220.84	124	1135.2	0	

NAPASKIAK

	LOC			KING		CHUM		RED		SILVER		PINK	
DATE	#	=<6	>6	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM	CPUE	CUM
6/2	4	X		1.25	1.25	0	0	0	0	0	0	0	0
6/6	4	X		12	13.25	25.33	25.33	0	0	0	0	0	0
6/8	4	X		23.07	36.32	42.67	68	4.8	4.8		0		0
6/9	4	X		16	52.32	104	172	0	4.8	0	0	0	0
6/10	4	X		37.49	89.81	74.94	246.94	41.68	46.48		0		0
6/13	4	X		57.96	147.77	31.63	278.57	10	56.48		0		0
6/14	4	X		4.46	152.23	29.52	308.09		56.48		0		0
6/15	4	X		12.63	164.86	31	339.09	0	56.48		0		0
6/17	4	X		13.7	178.56	139.3	478.42	3.6	60.08		0		0
6/18	4	X		3.33	181.89	60.33	538.75	5.33	65.41		0		0
6/21	4	X		21.17	203.06	126.9	665.63	14.46	79.87		0		0
6/22	4	X		11.11	214.17	274	939.63	52.67	132.54		0		0
6/23	4	X		17	231.17	140	1079.63	33	165.54		0		0
6/27	4	X		9.33	240.5	148.7	1228.3	30.33	195.87		0		0
6/29	4	X		5	245.5	142.8	1371.05	9	204.87		0		0
6/30	4	X		1.33	246.83	169.3	1540.38	69.33	274.2		0		0
7/1	4	X		4	250.83	284	1824.38	16	290.2		0		0
7/6	4	X		0	250.83	300	2124.38	14	304.2	0	0		0
7/19	4	X		2	252.83	78	2202.38	0	304.2	0	0	0	0
8/9	4	X		0	252.83	2.33	2204.71	0	304.2	101.67	101.67	2.67	2.67

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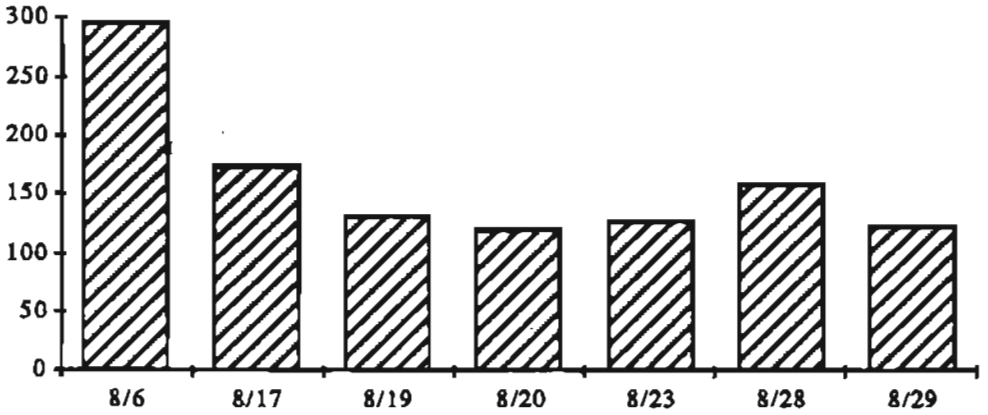

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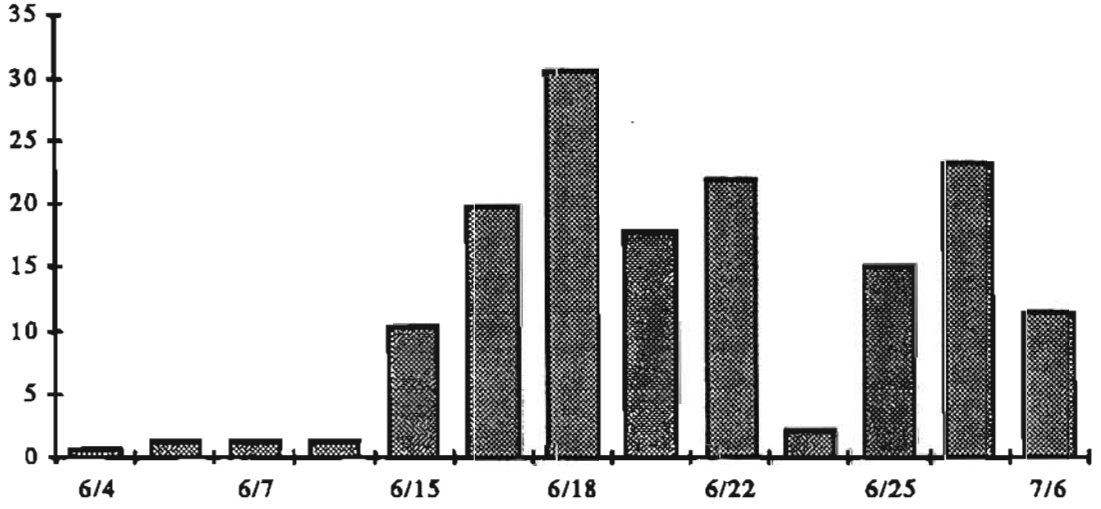

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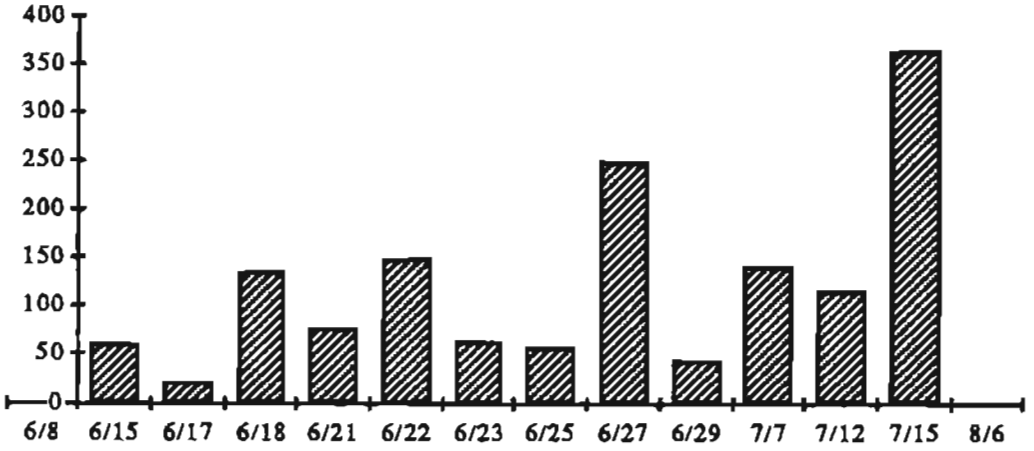

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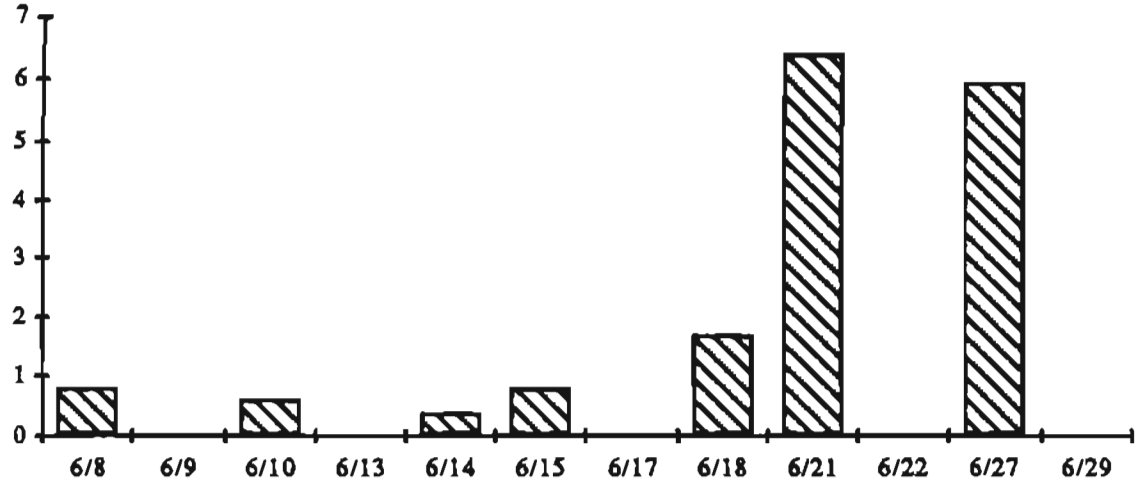

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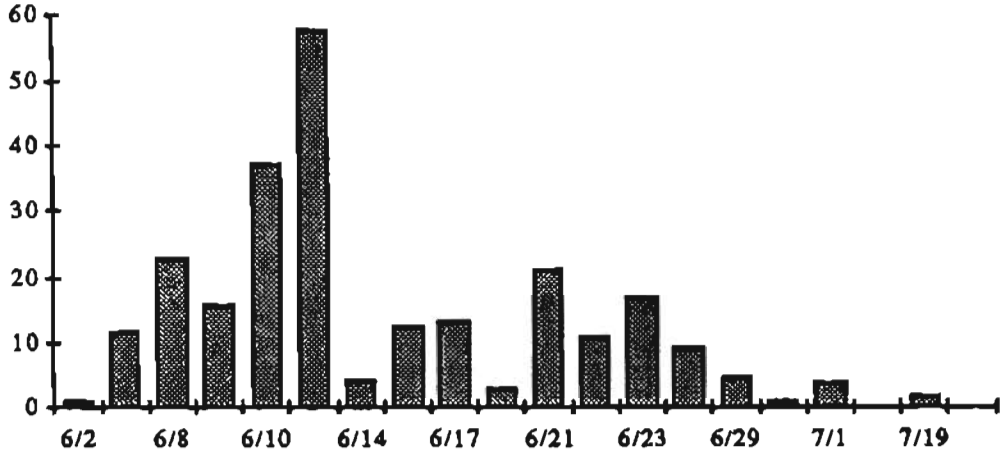

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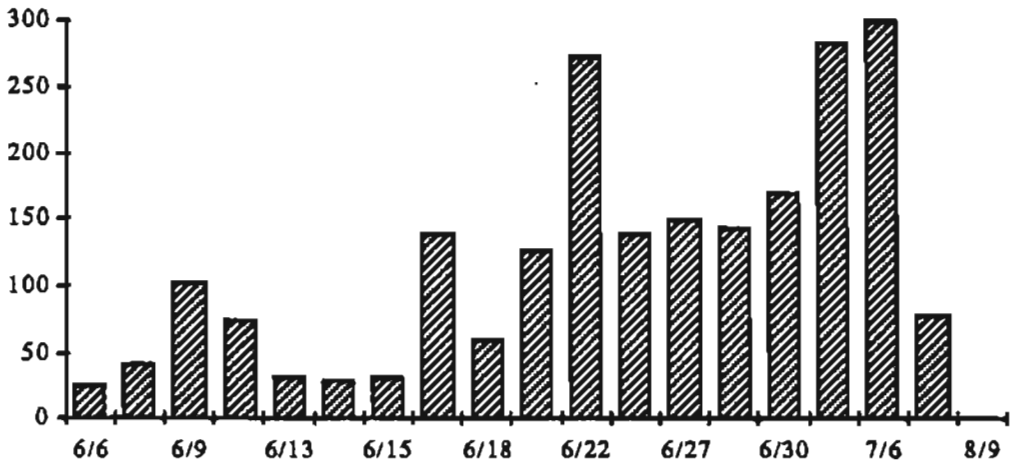

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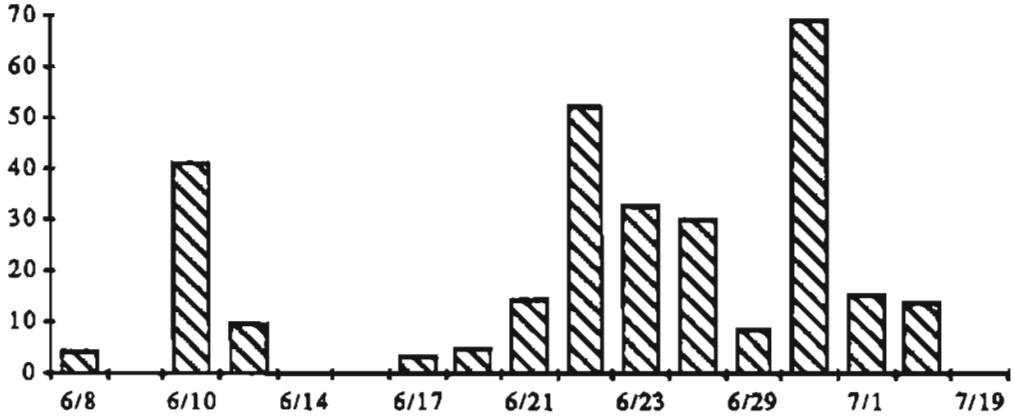

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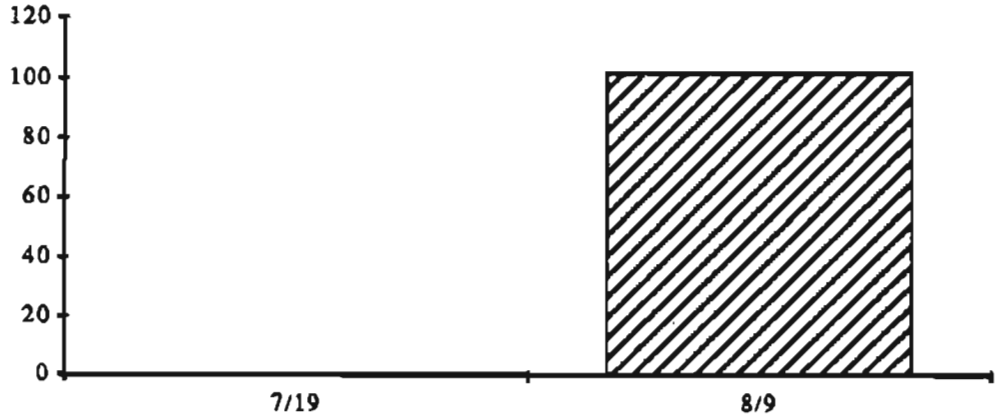

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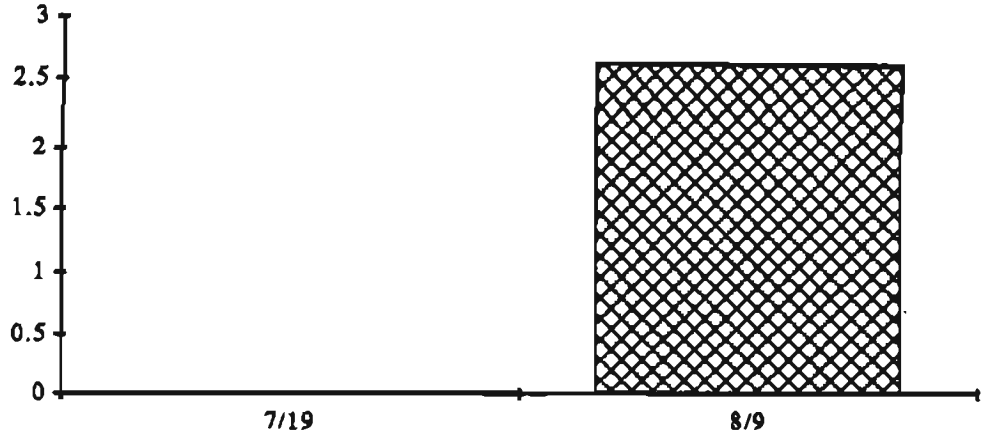

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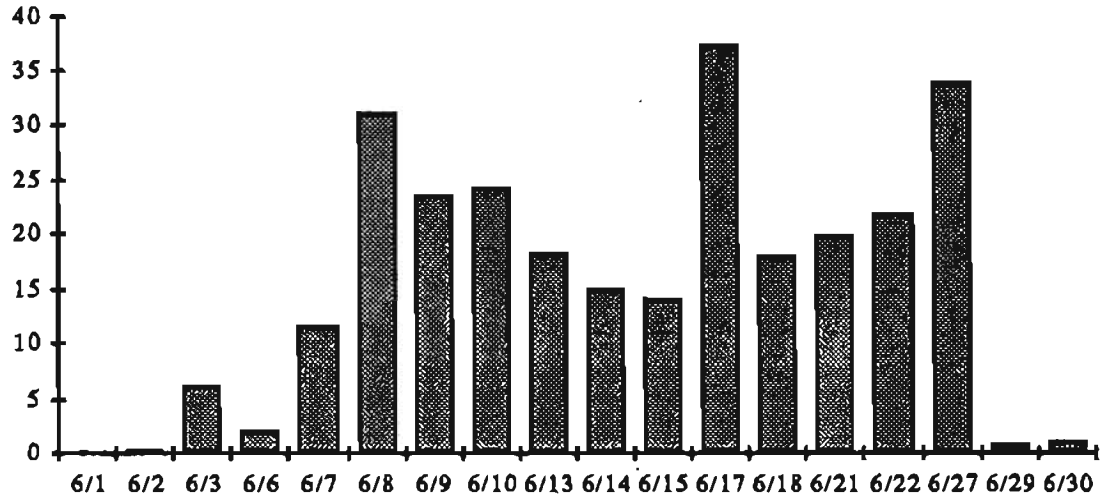

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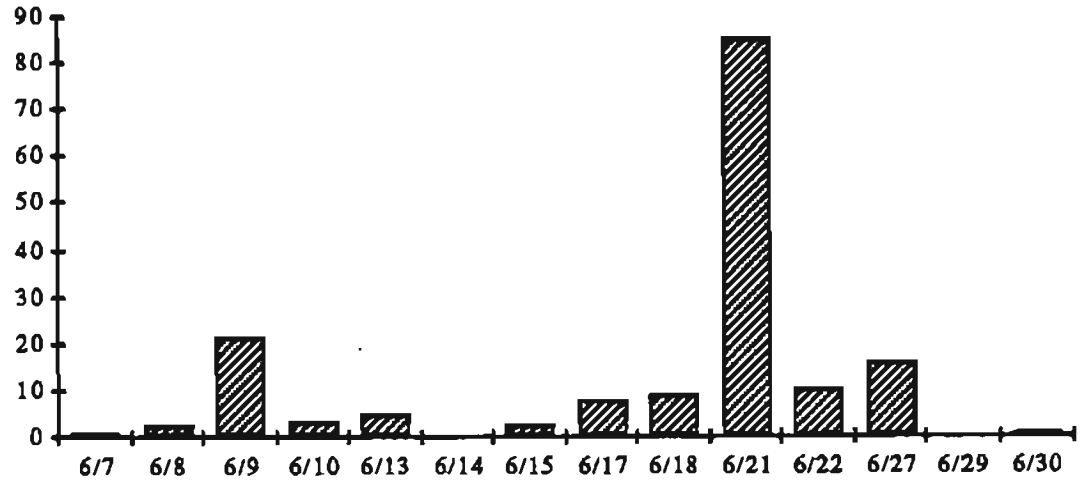

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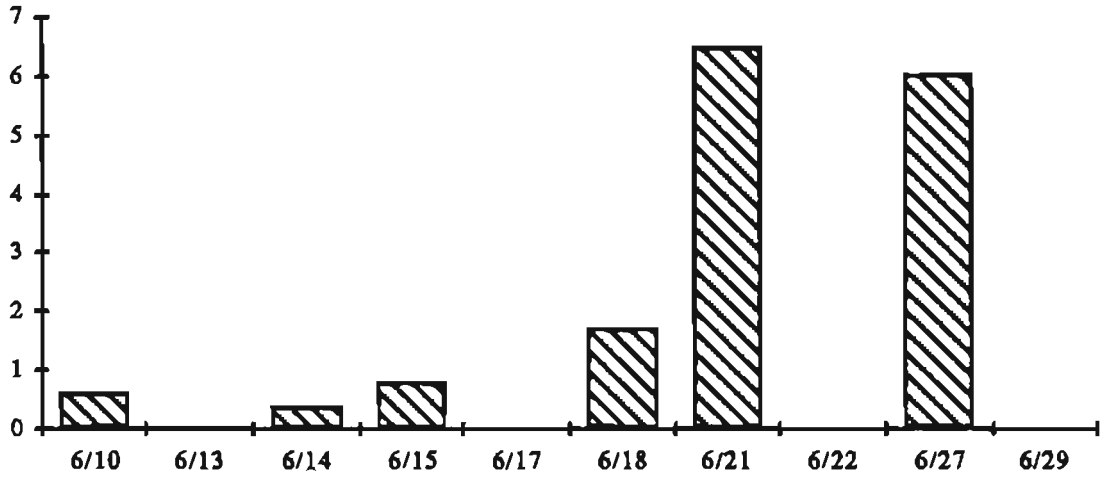

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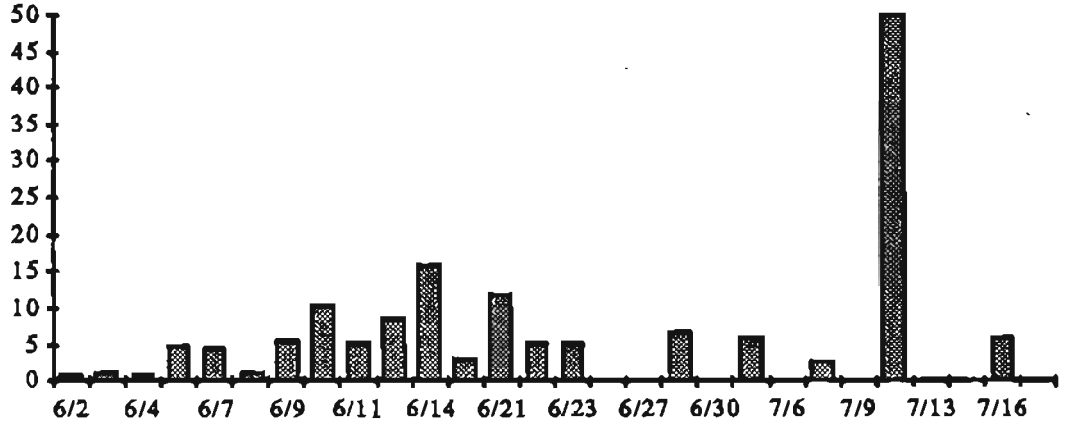

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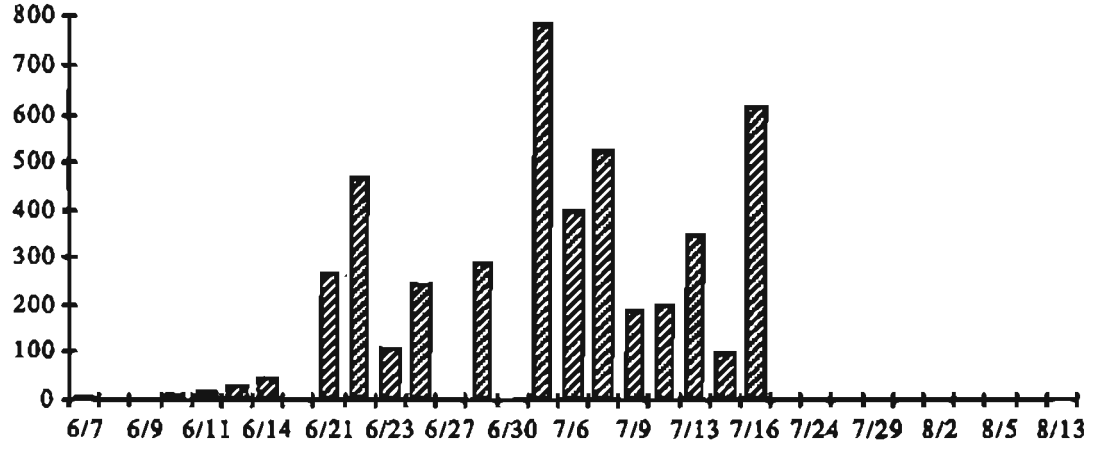

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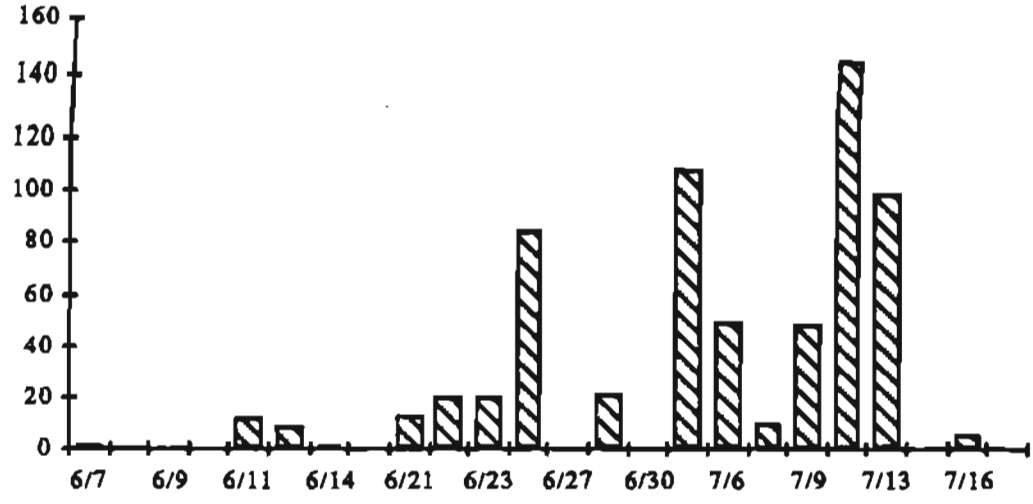

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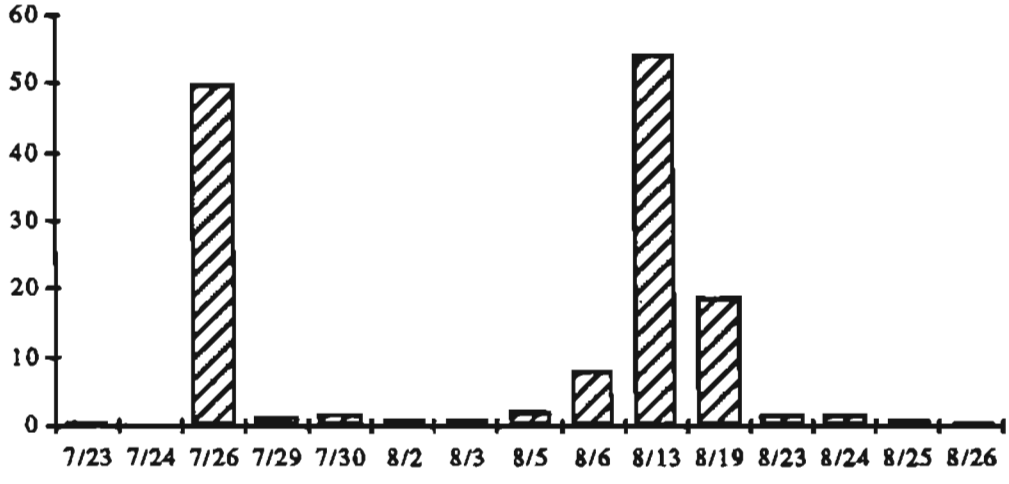

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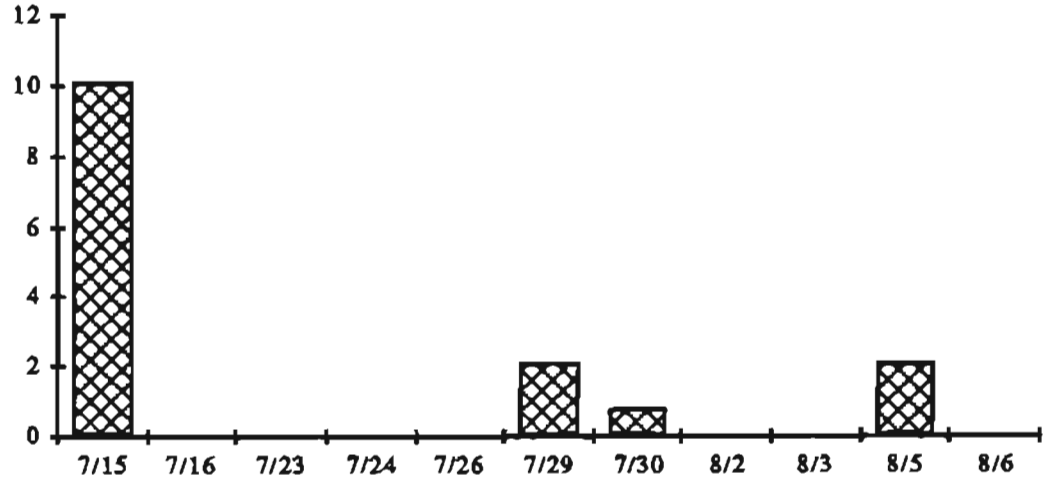

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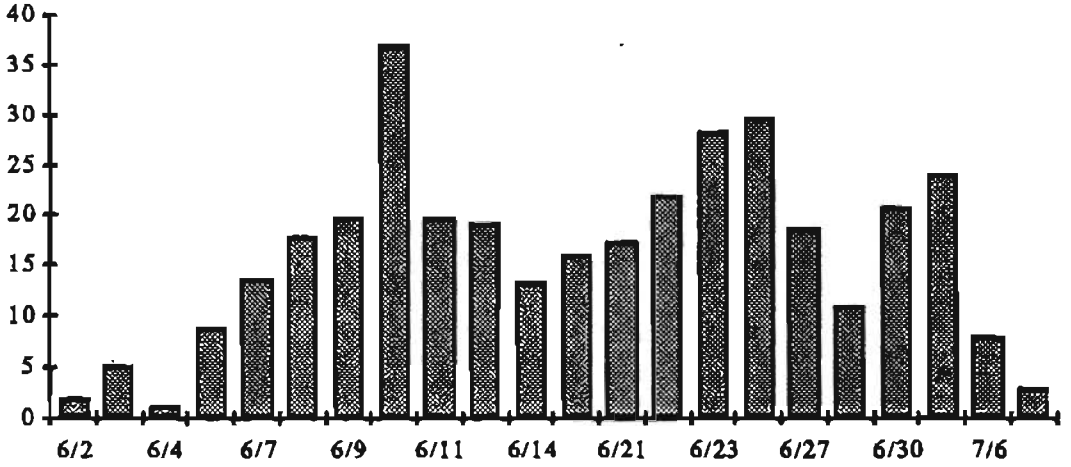

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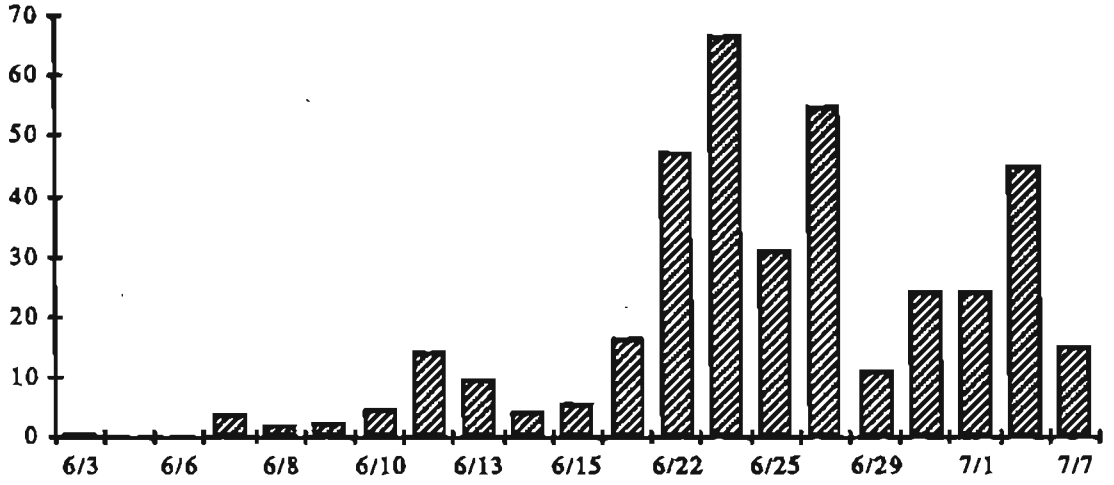

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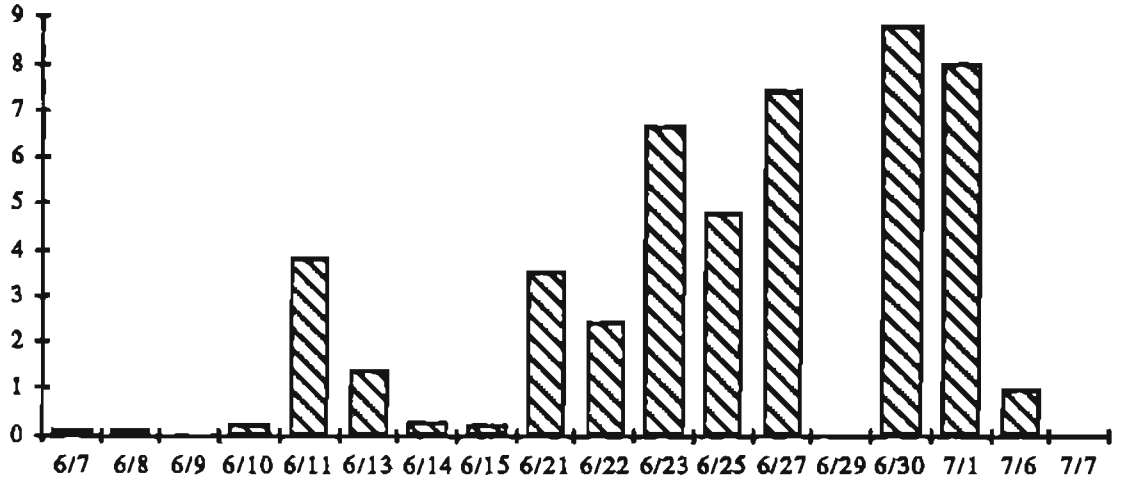

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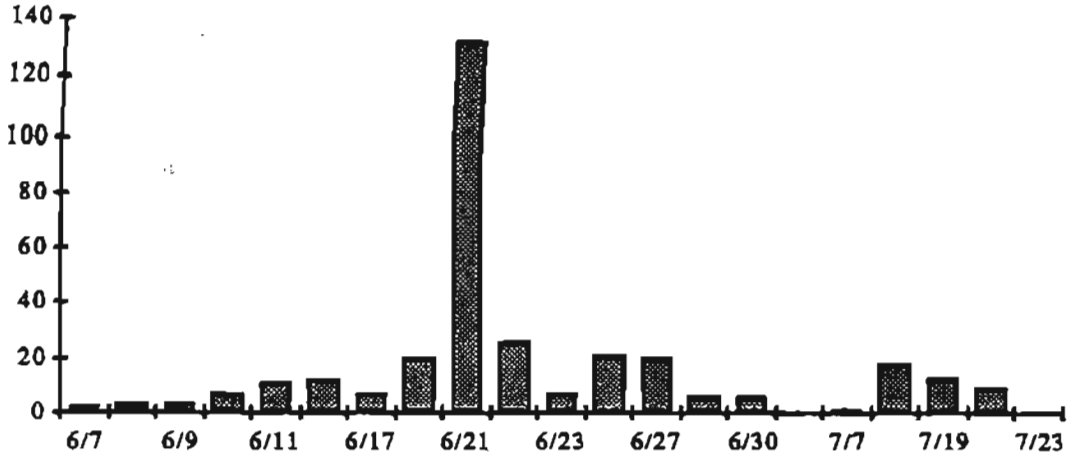

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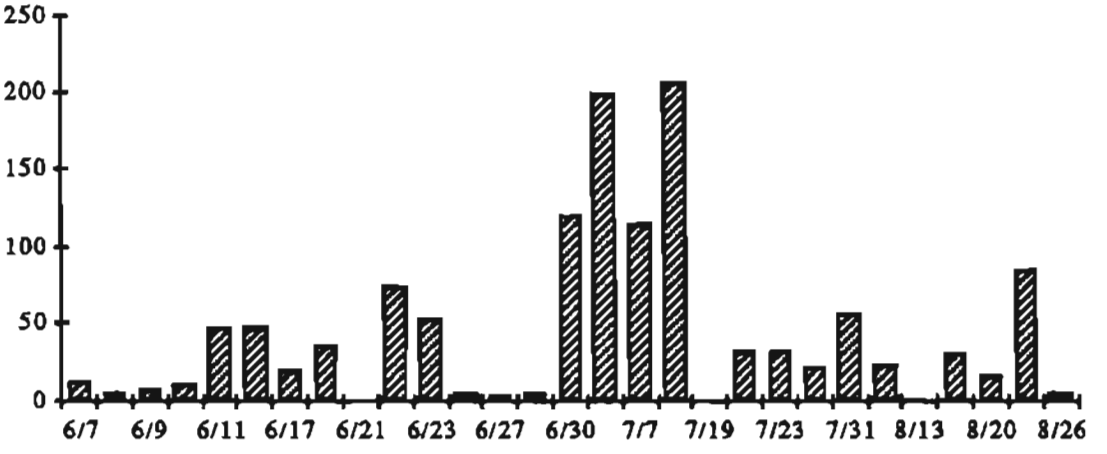

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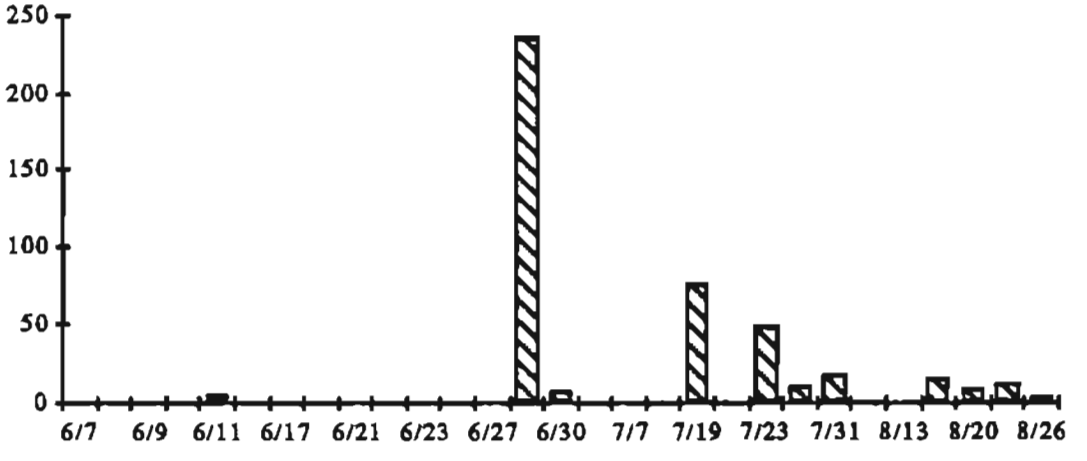

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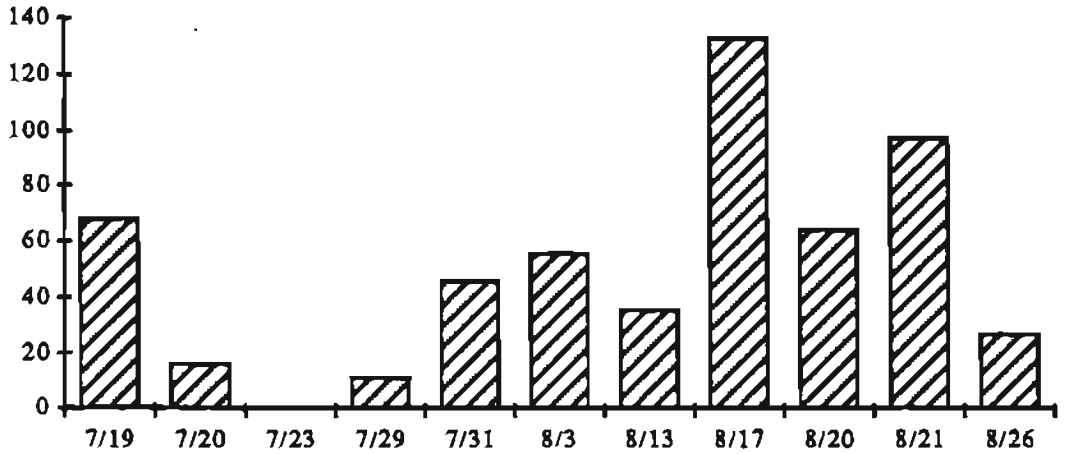

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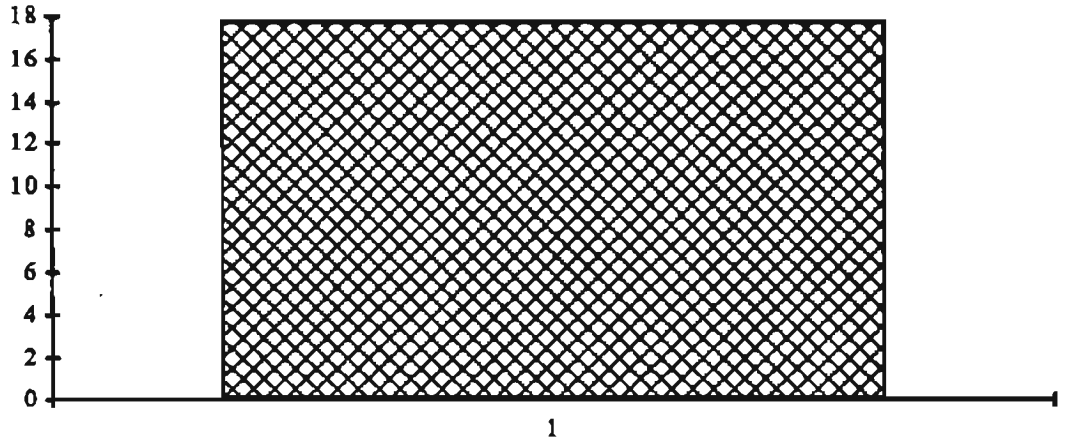

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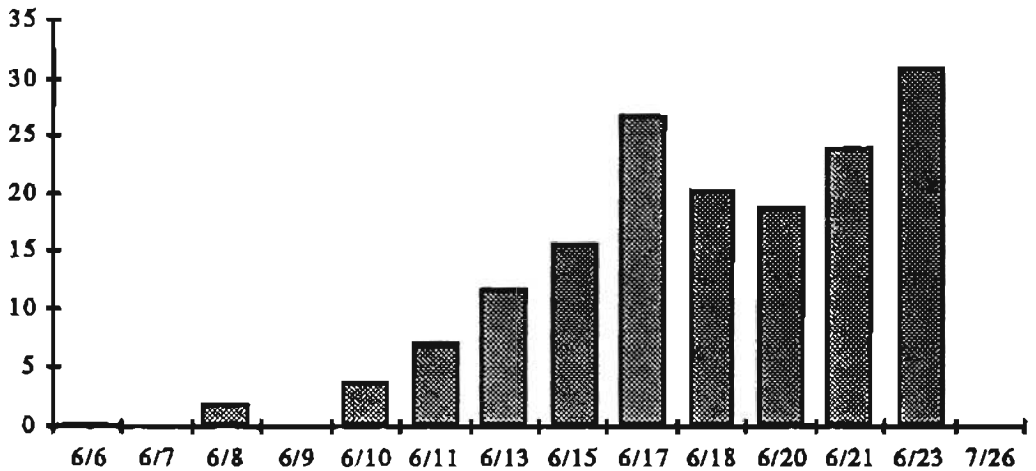

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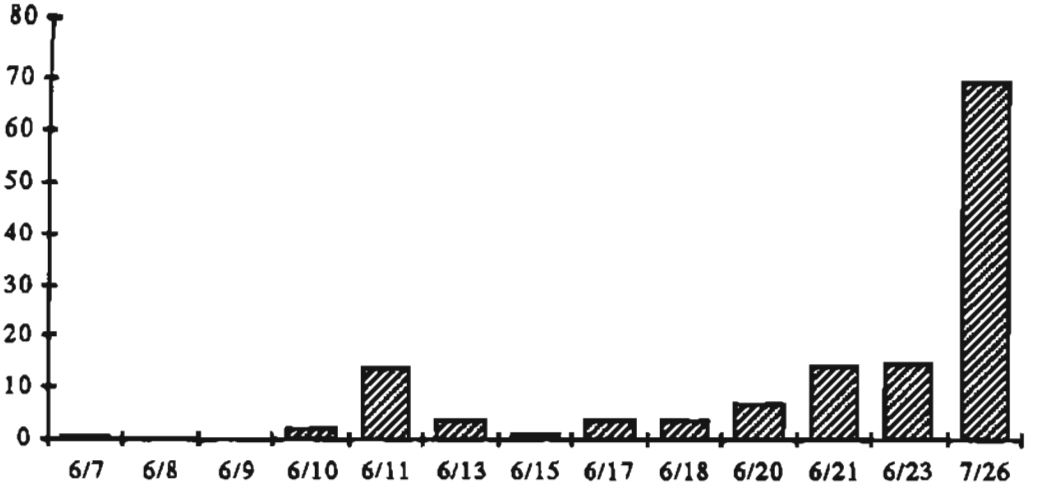

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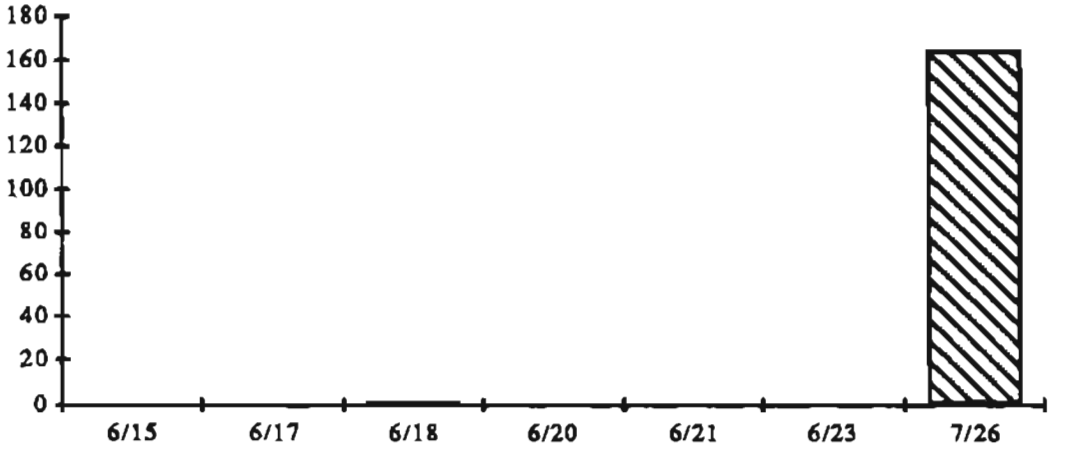

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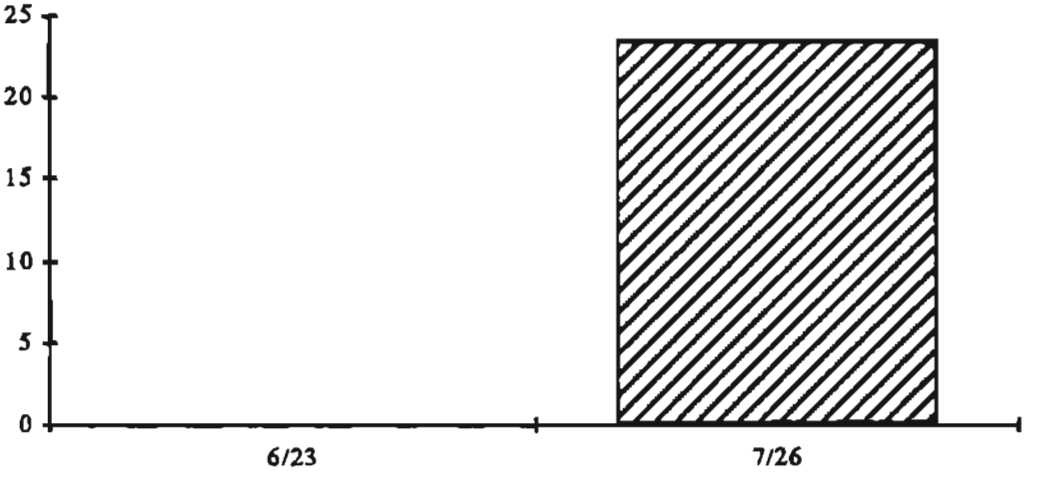

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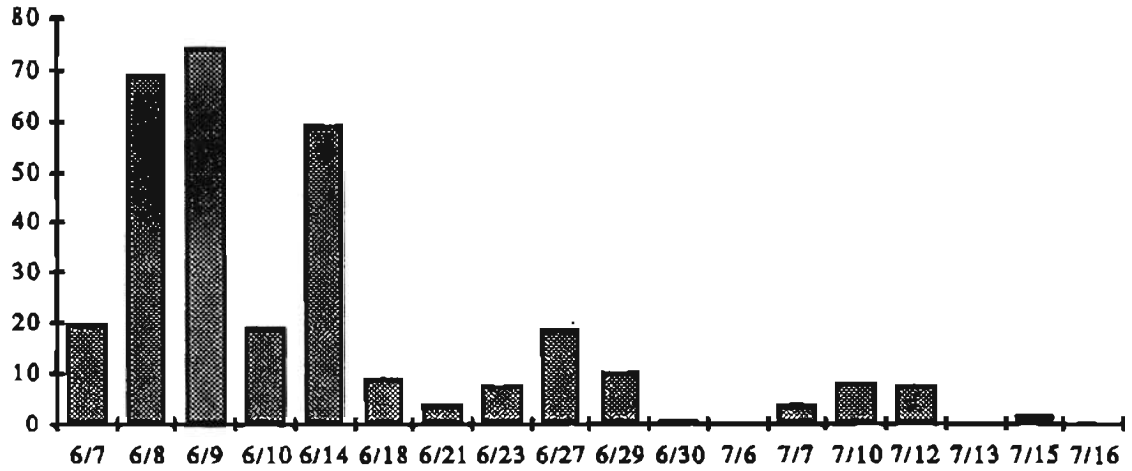

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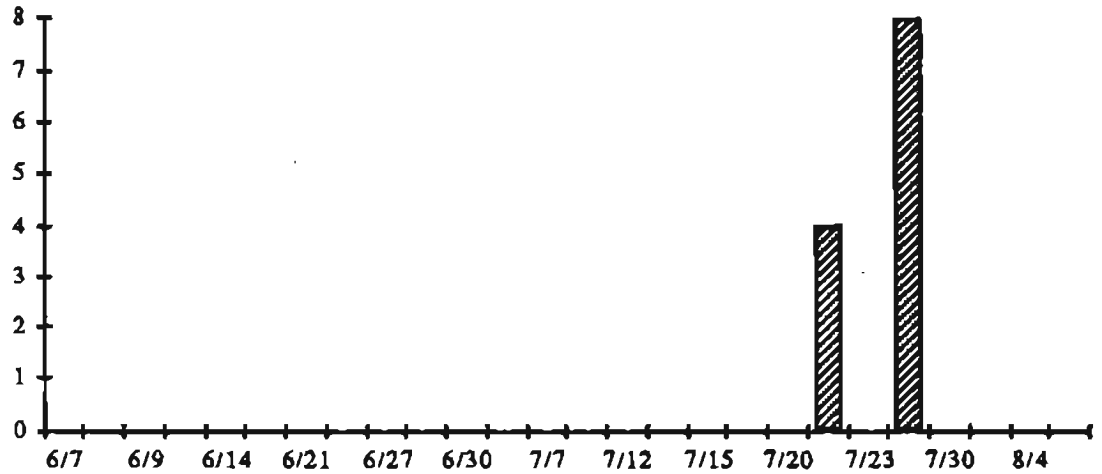

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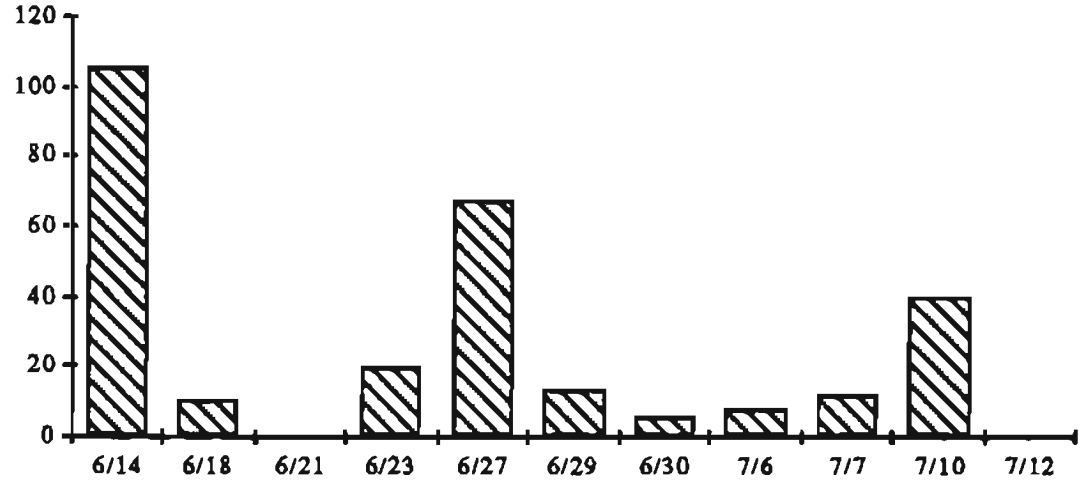

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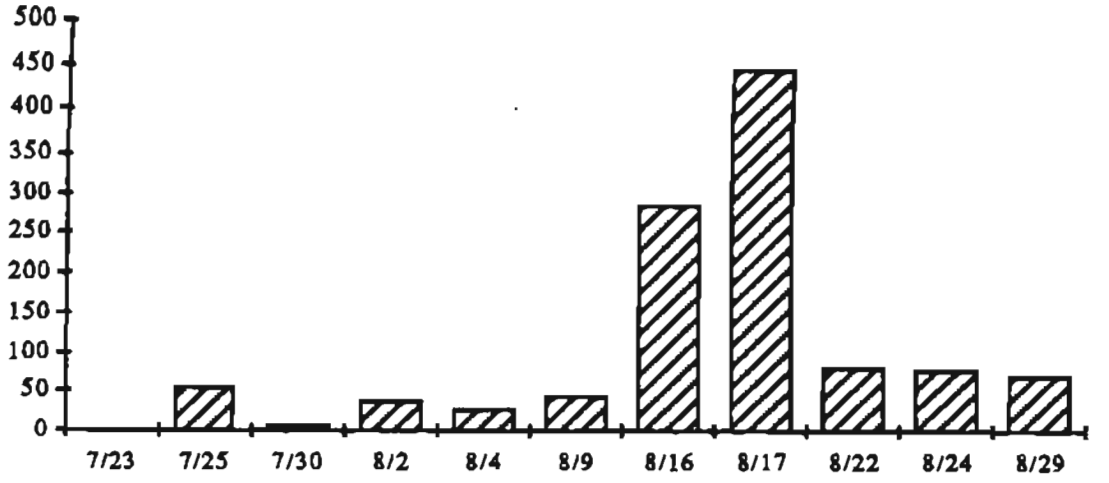

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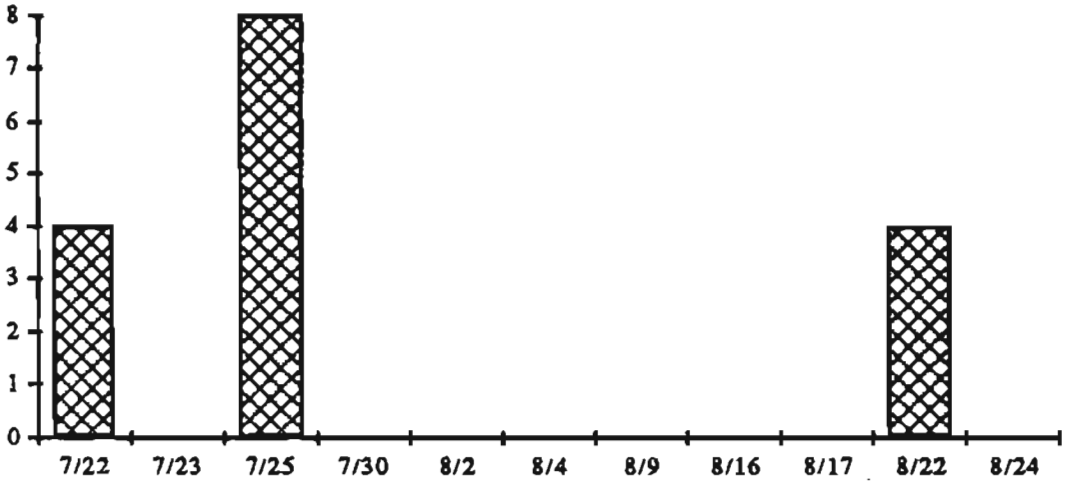

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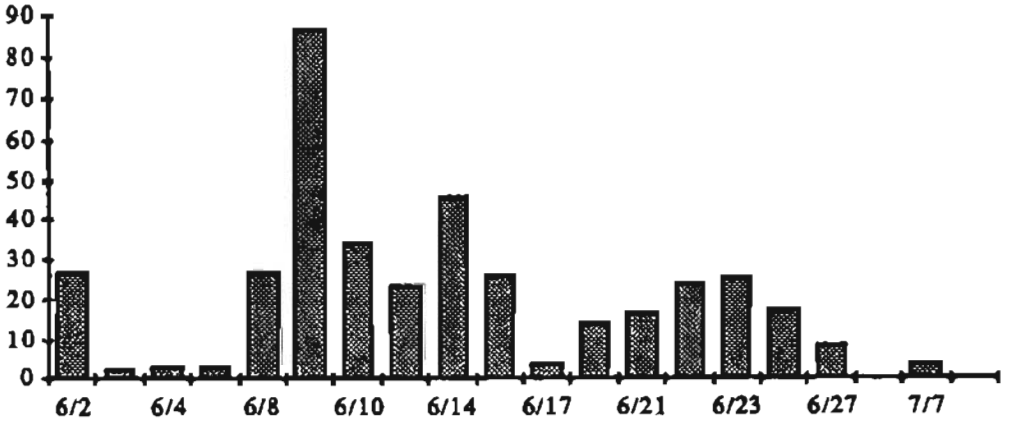

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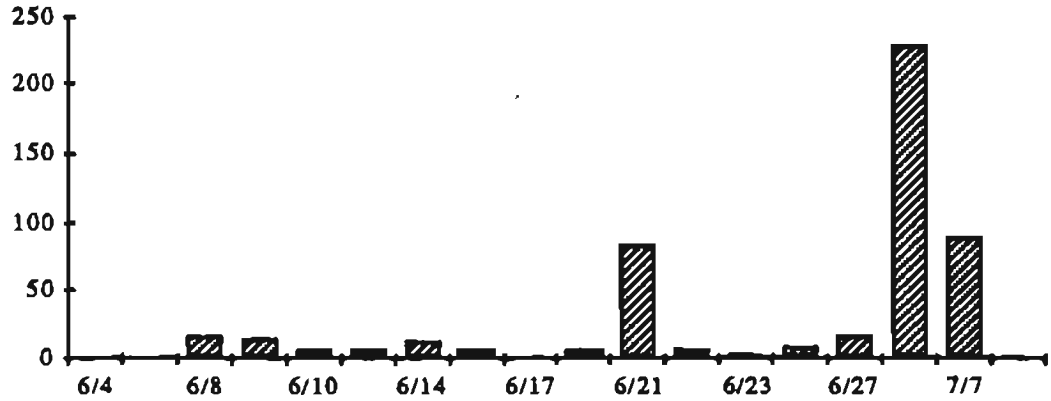

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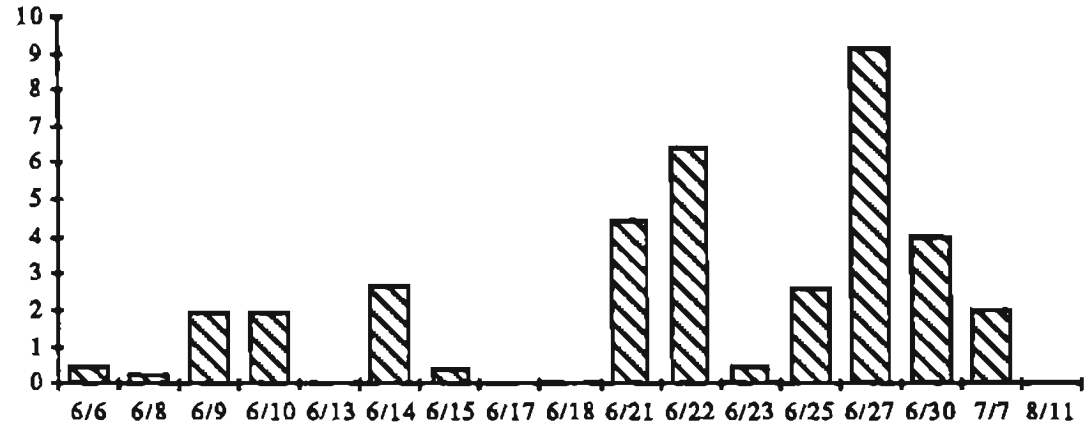

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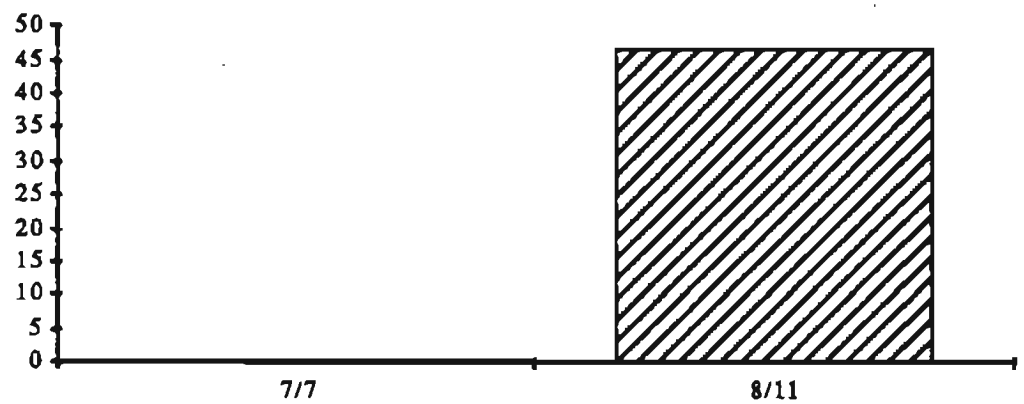

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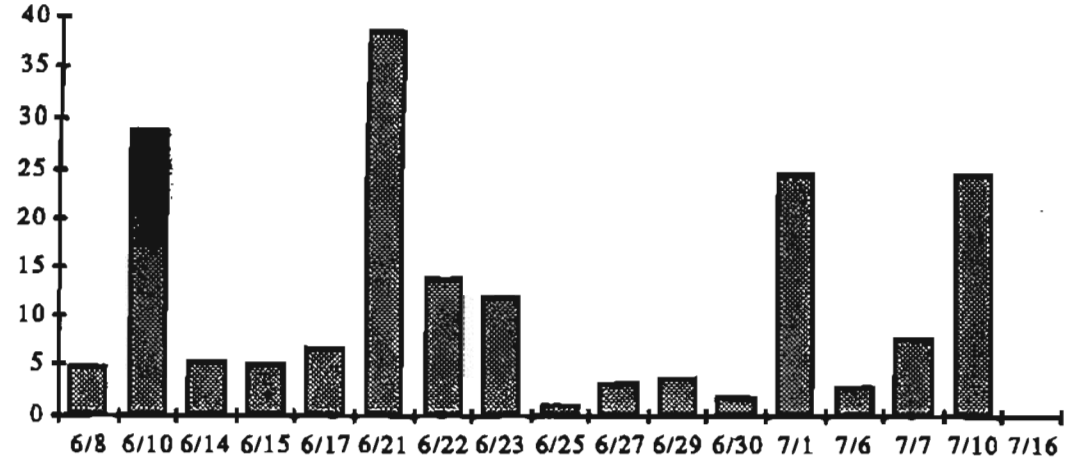

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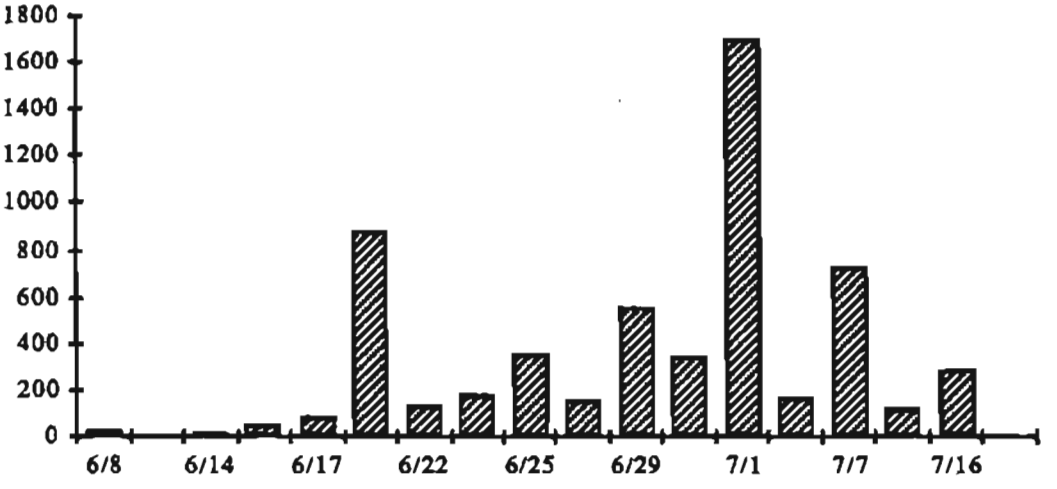

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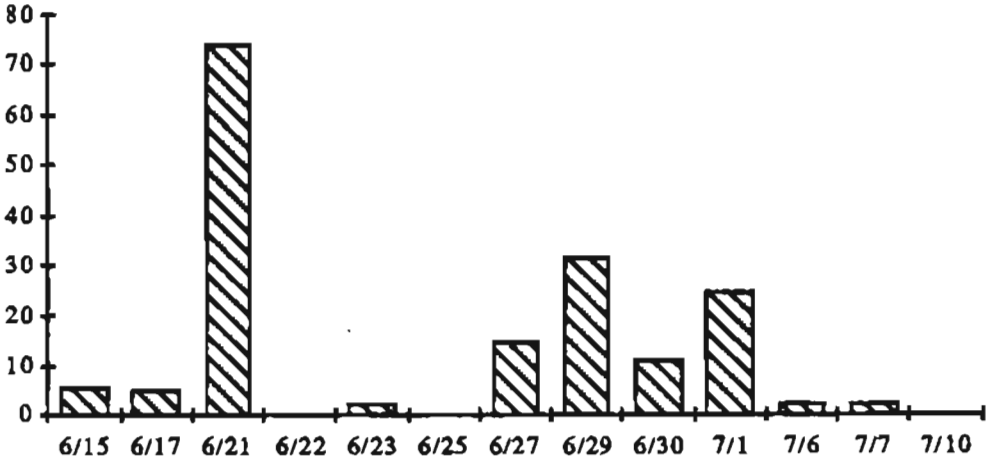

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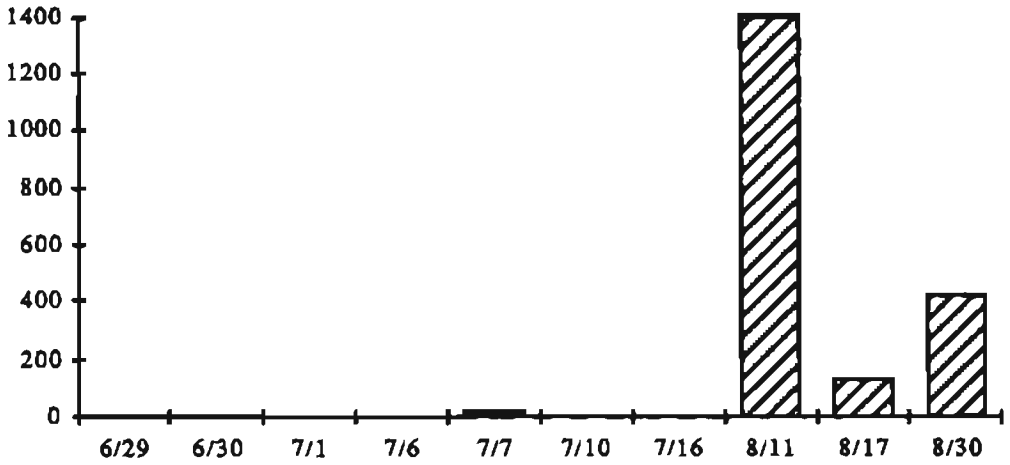

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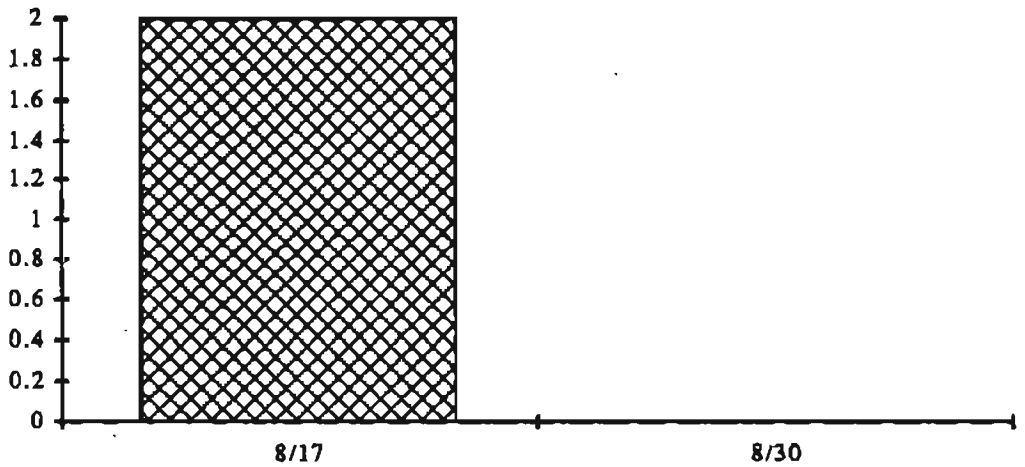

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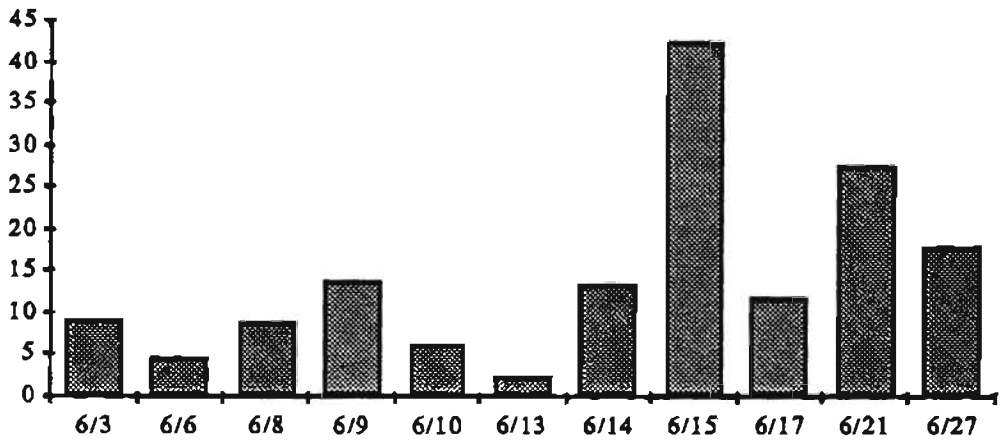

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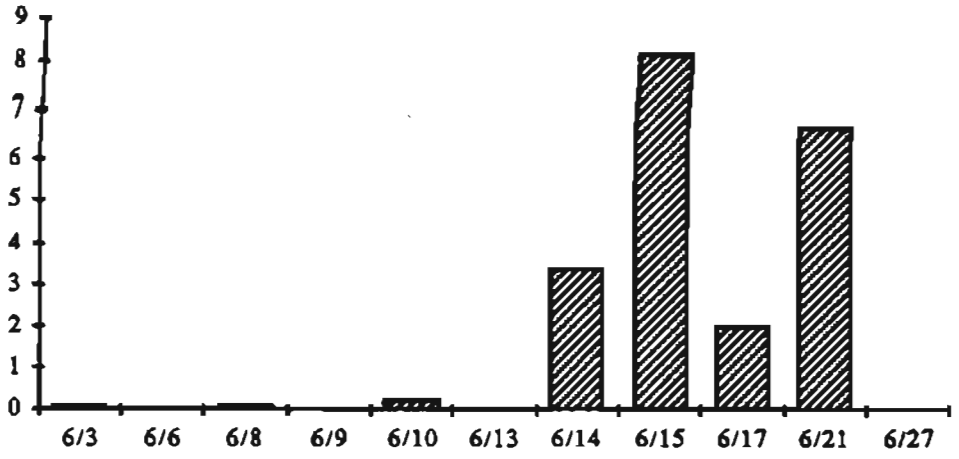

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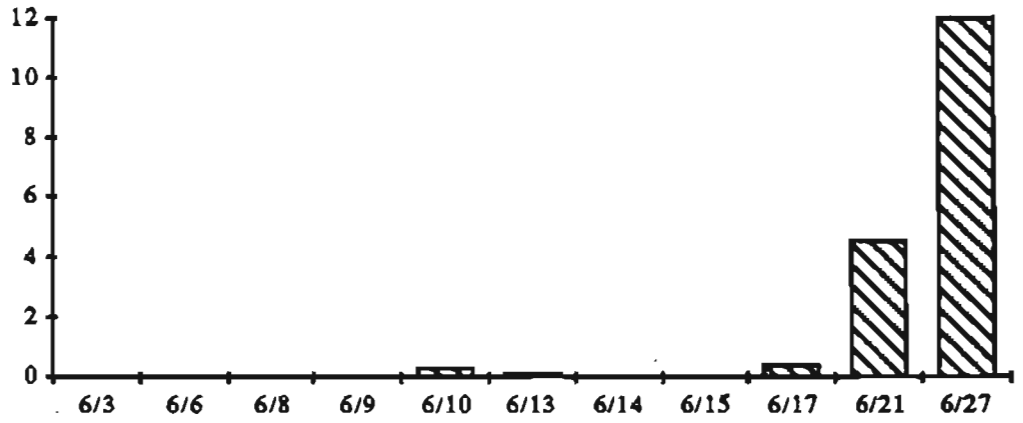

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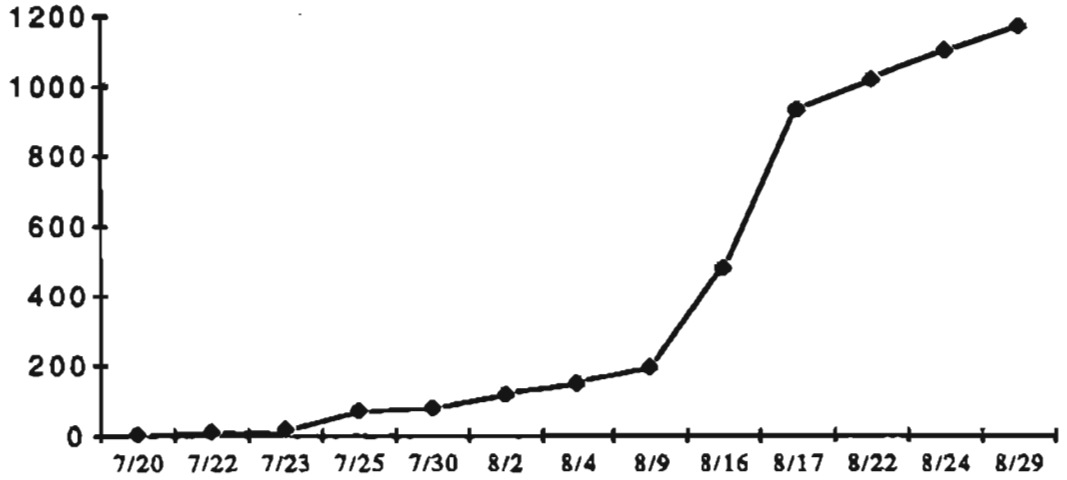

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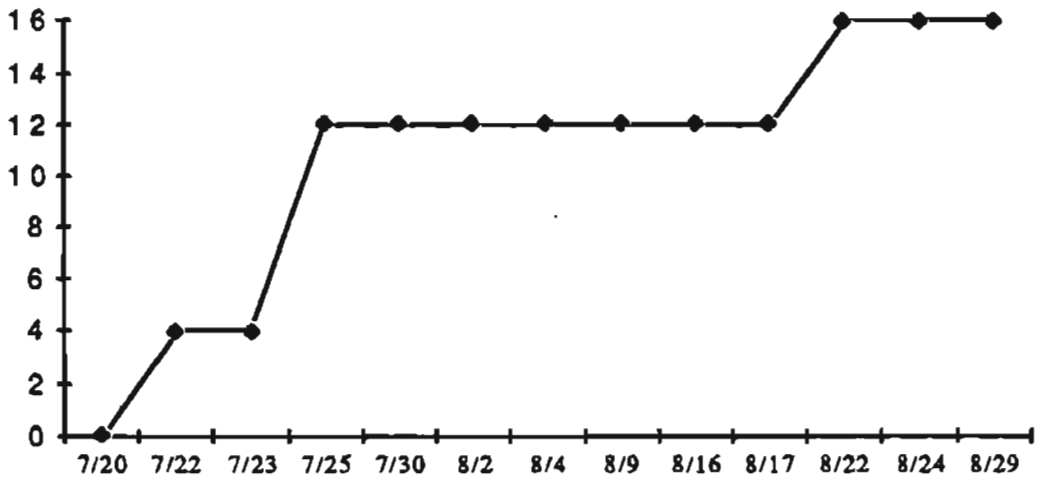

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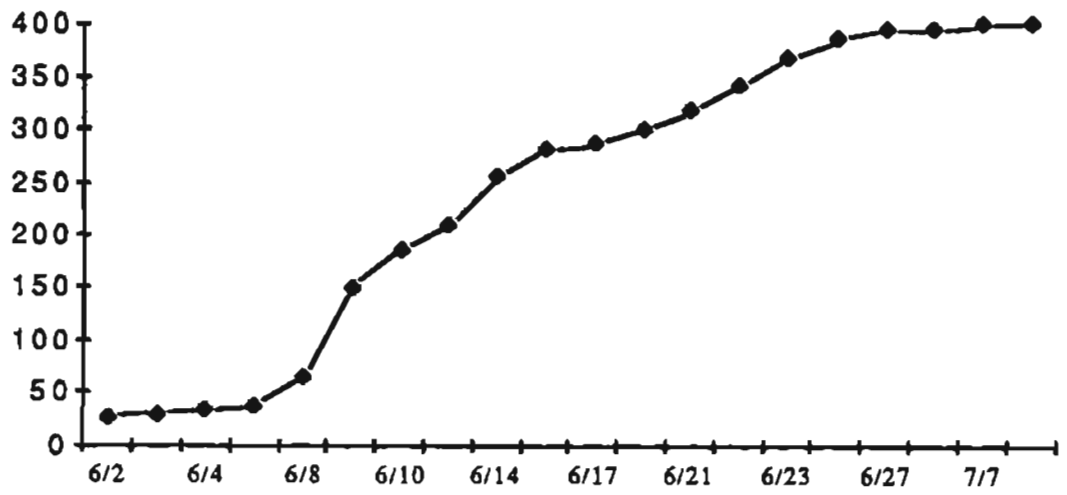

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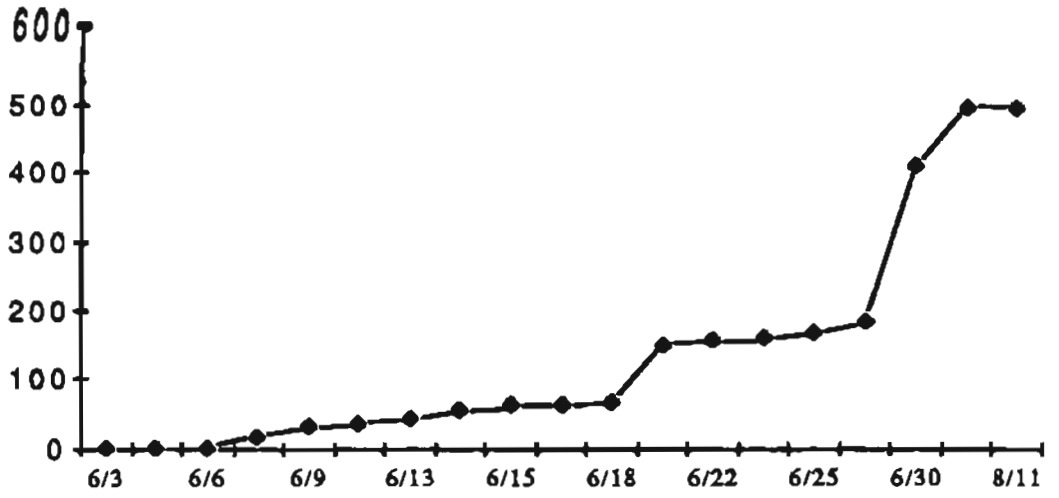

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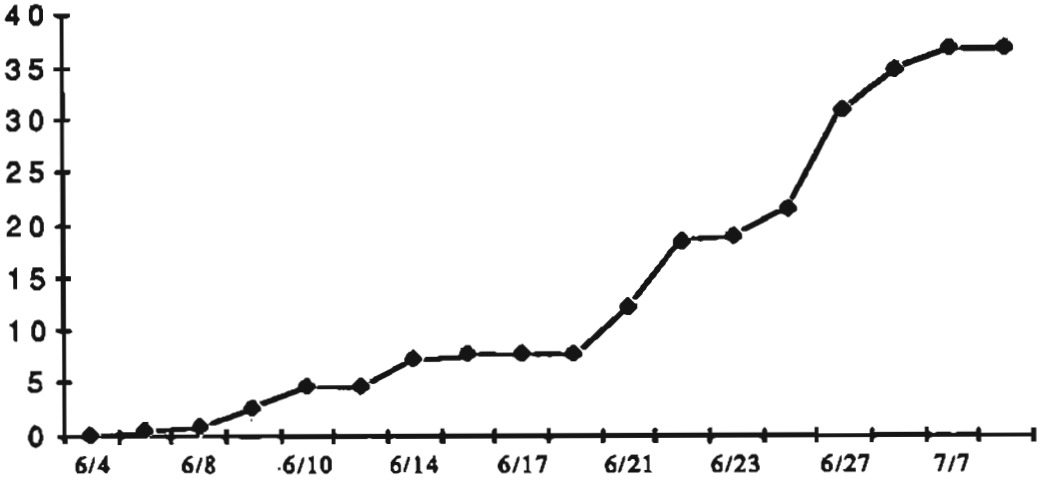

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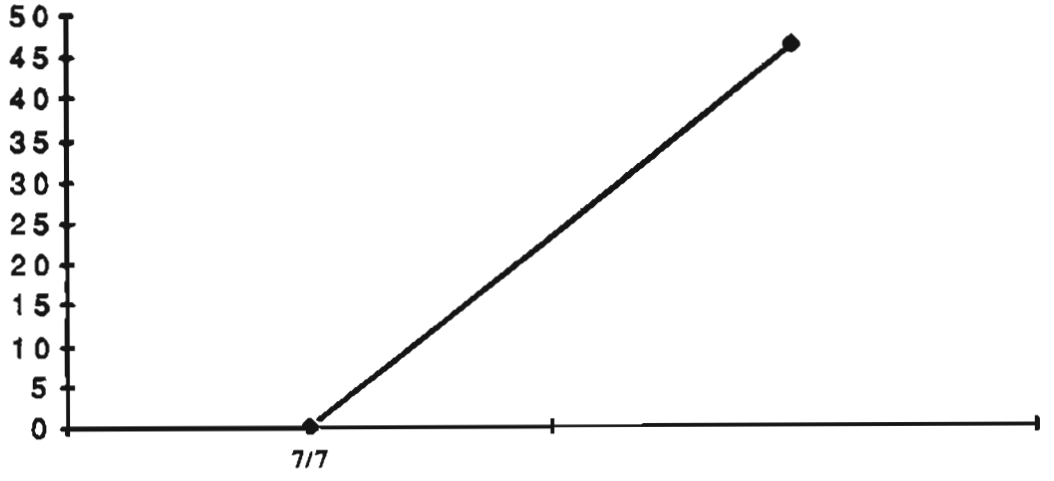

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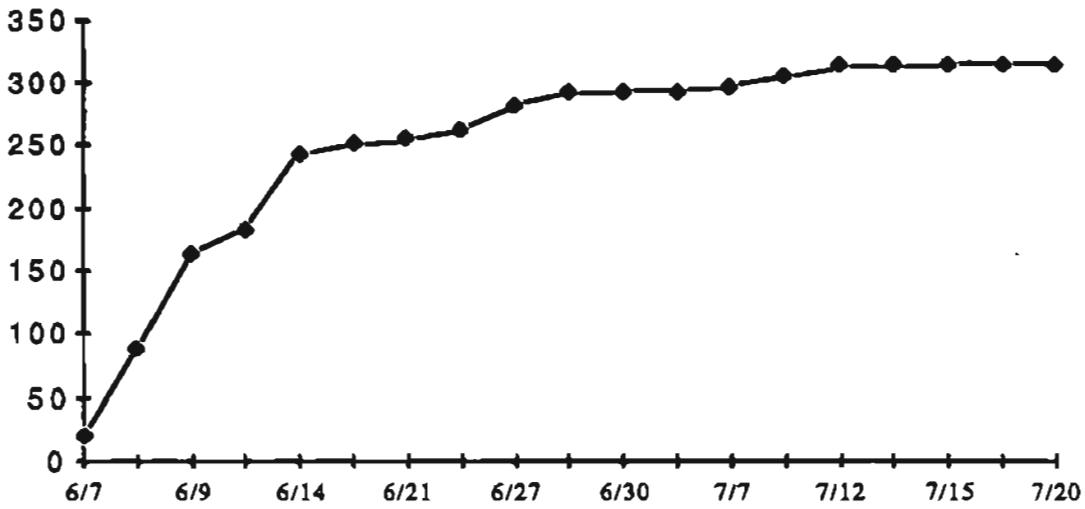

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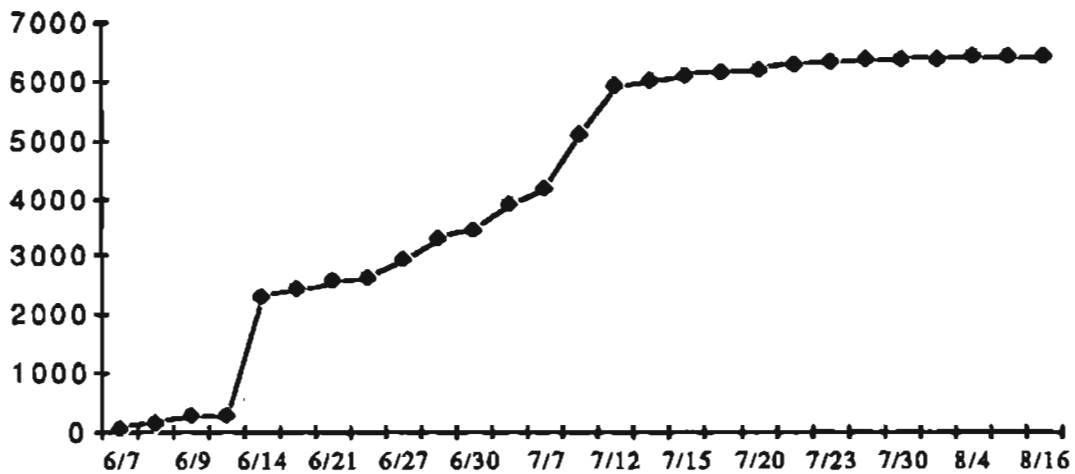

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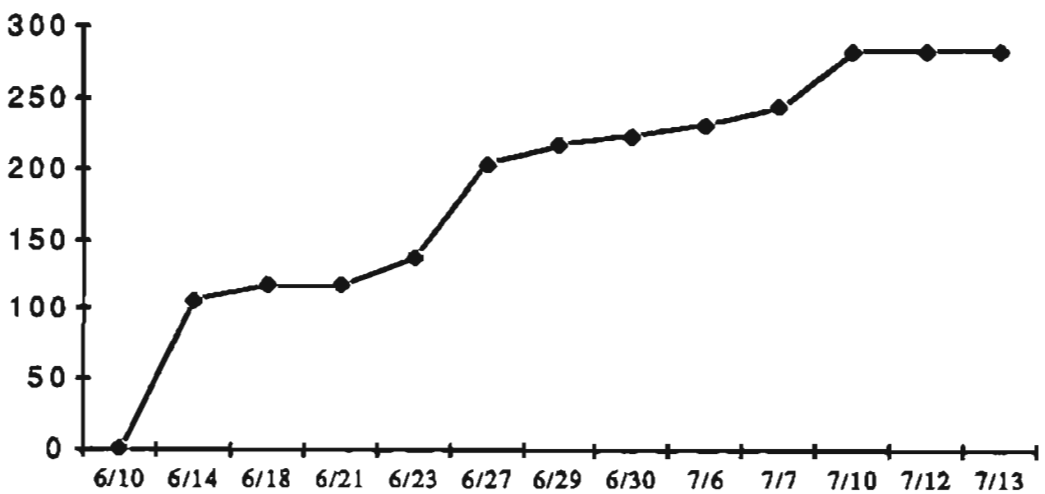

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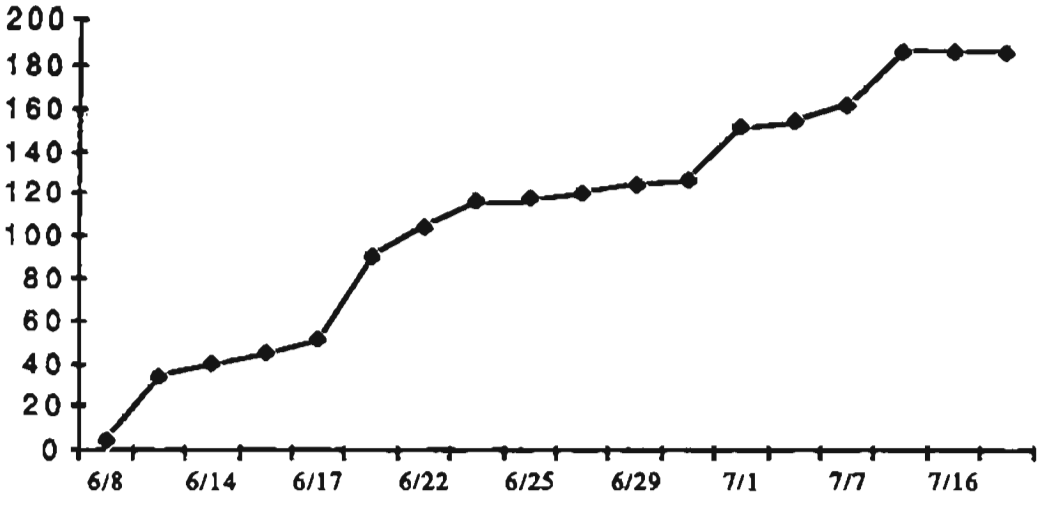

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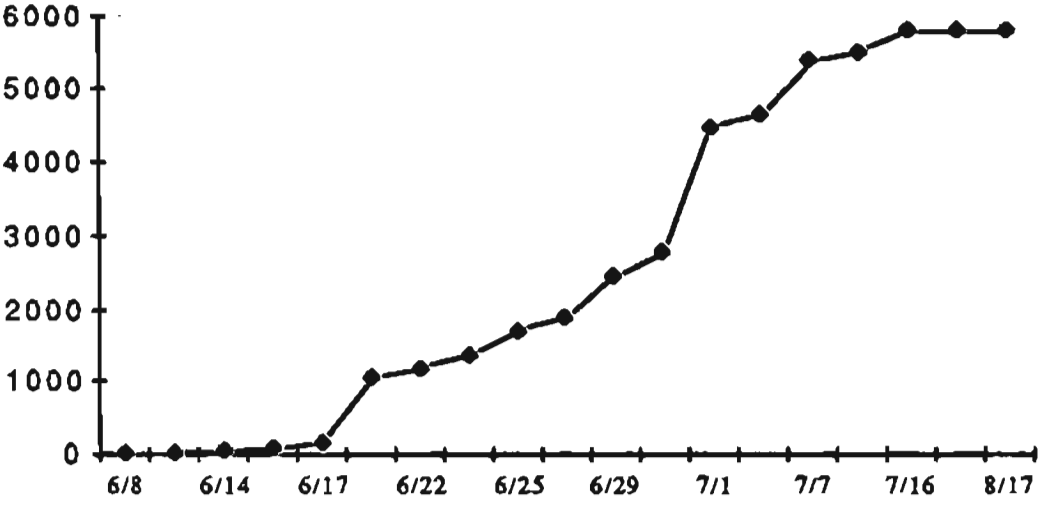

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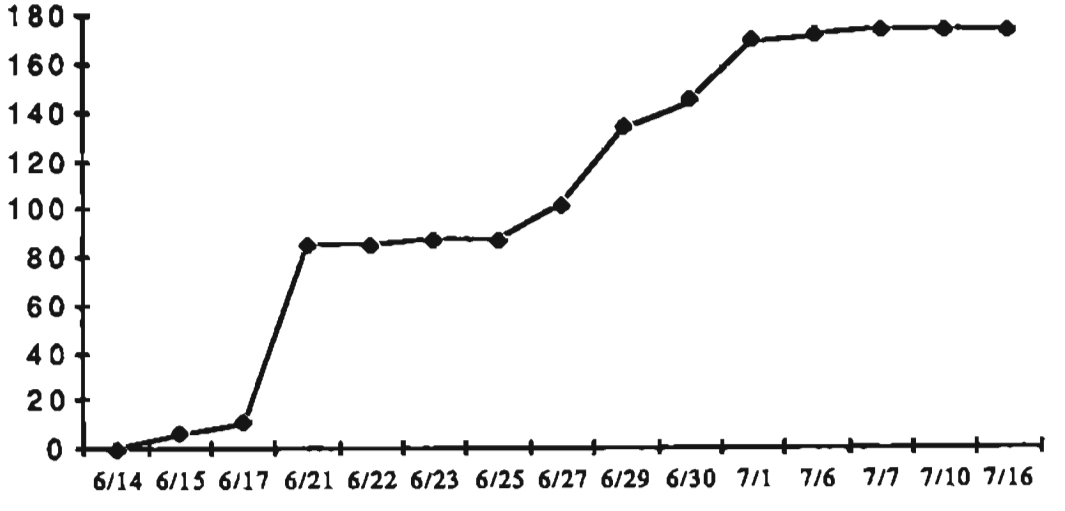

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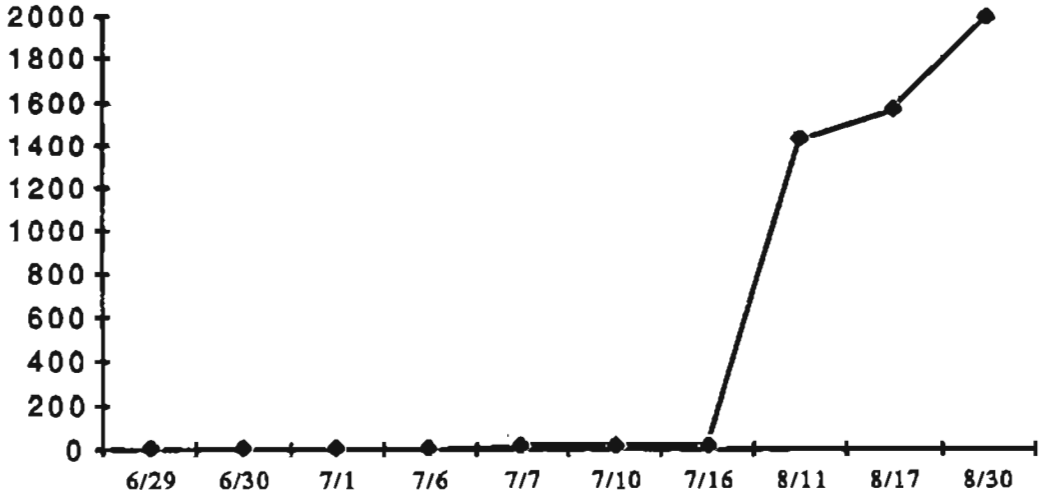

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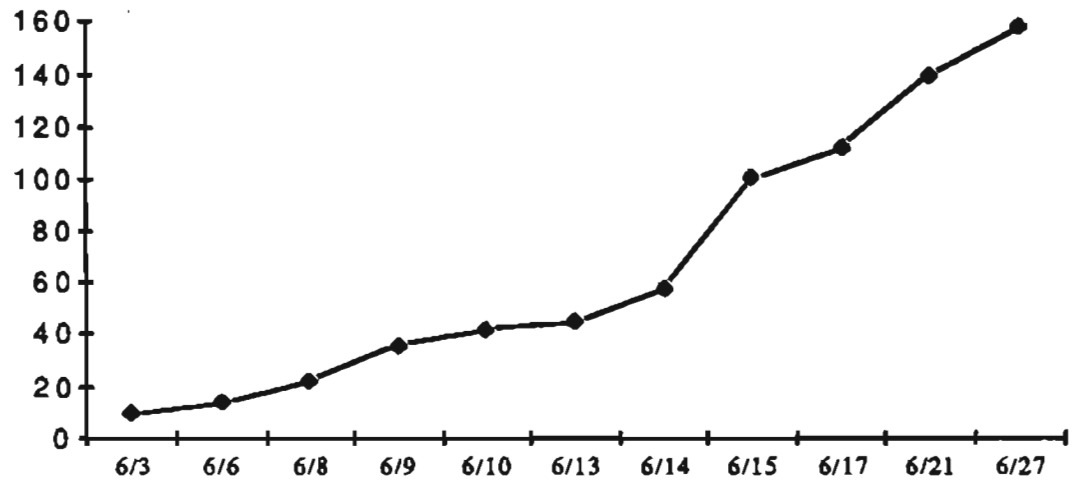

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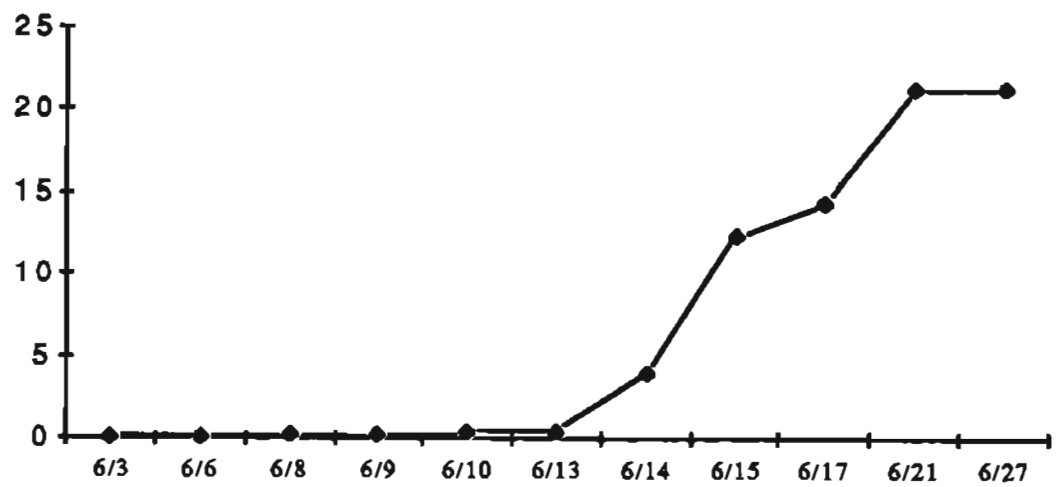

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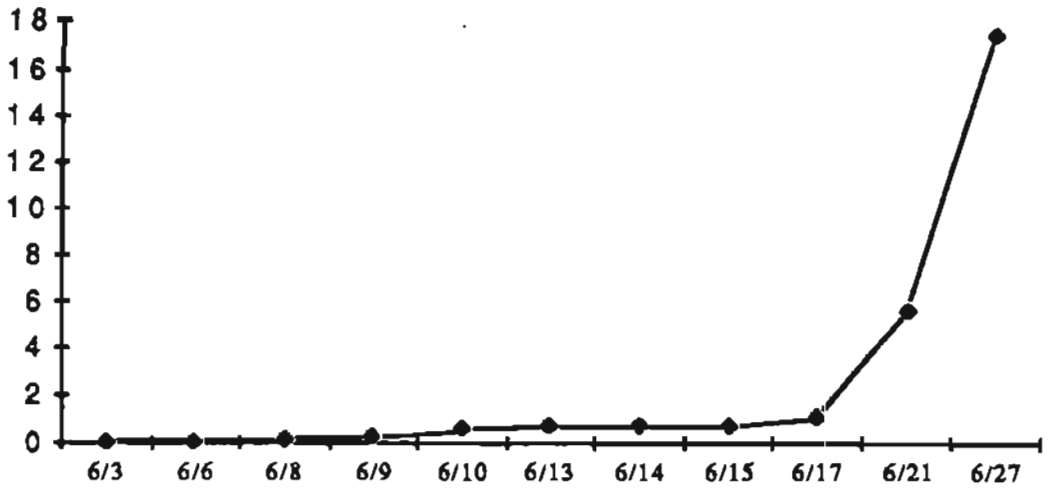
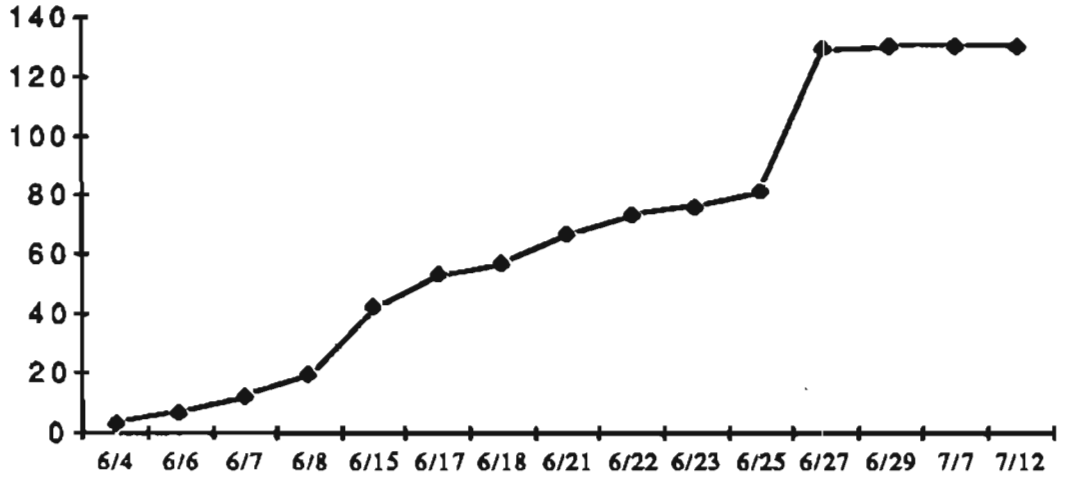


NAPAKIAK CUMULATIVE KING CPUE <=6



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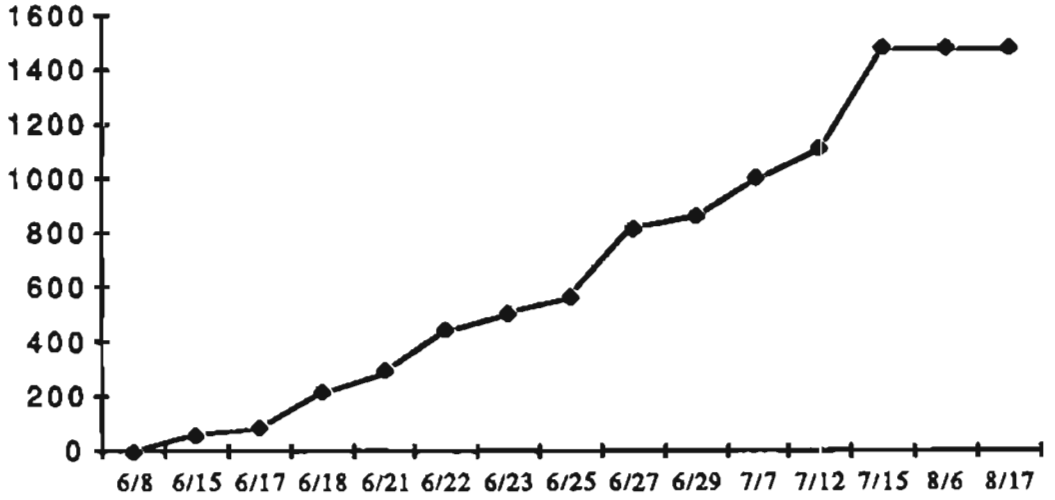

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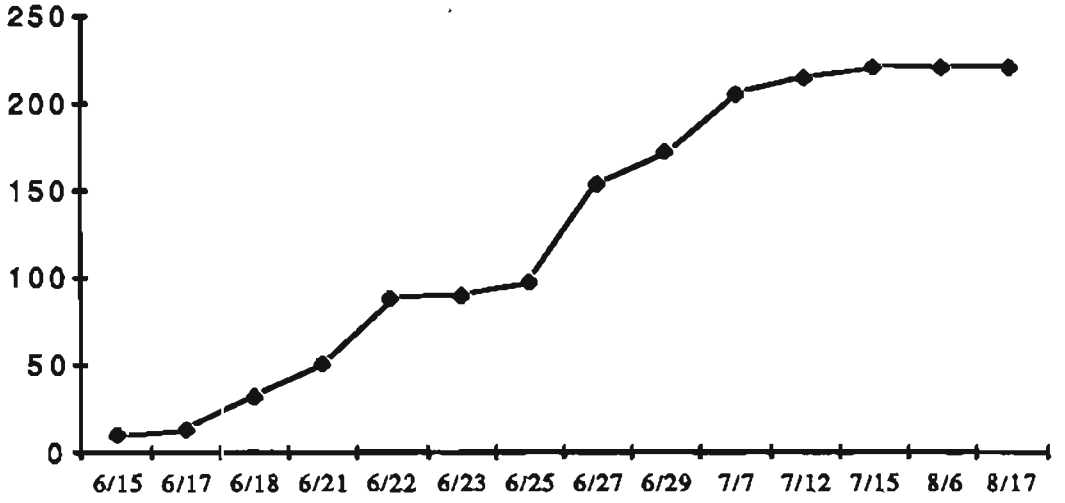
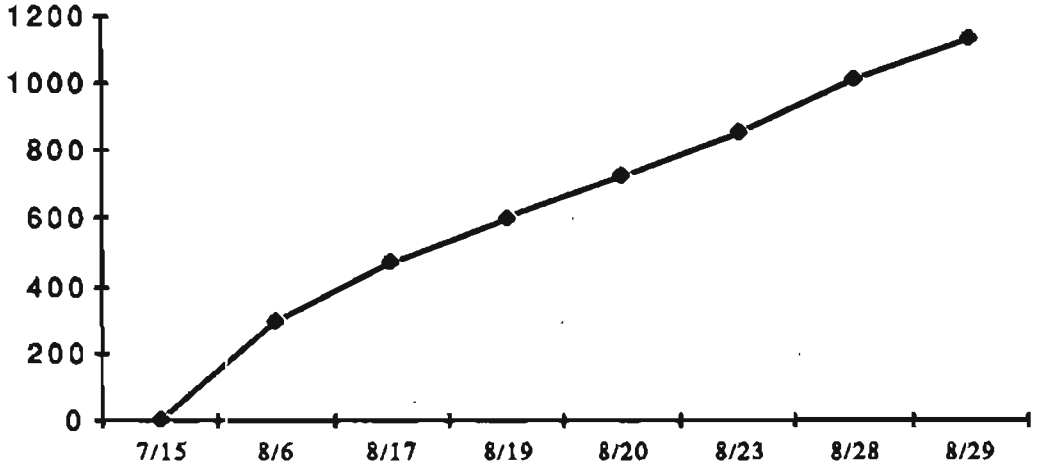


NAPAKIAK CUMULATIVE SILVER CPUE<=6



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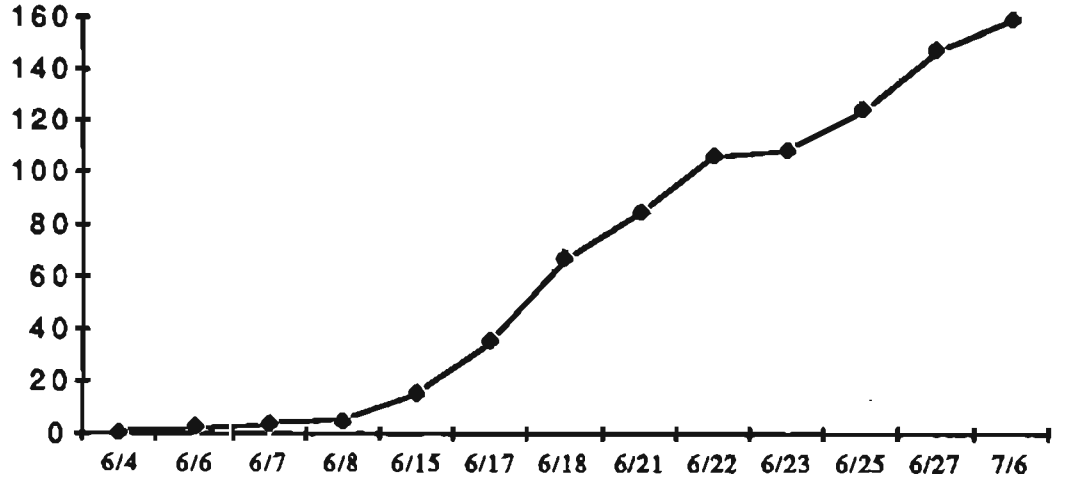

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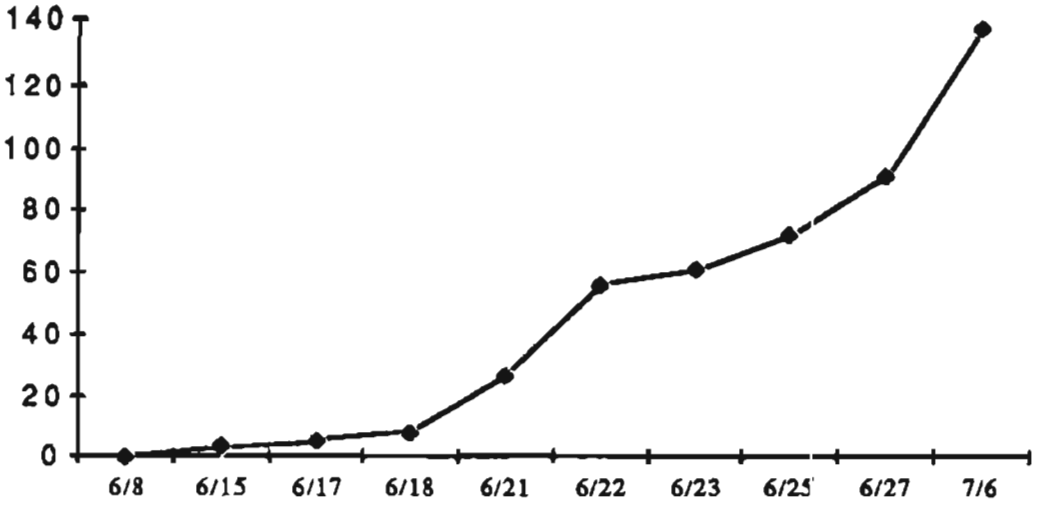

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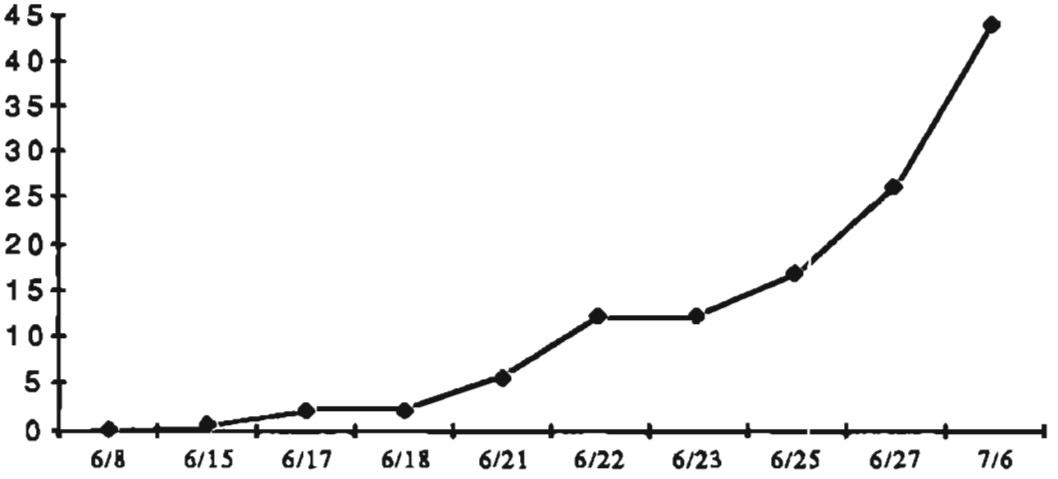

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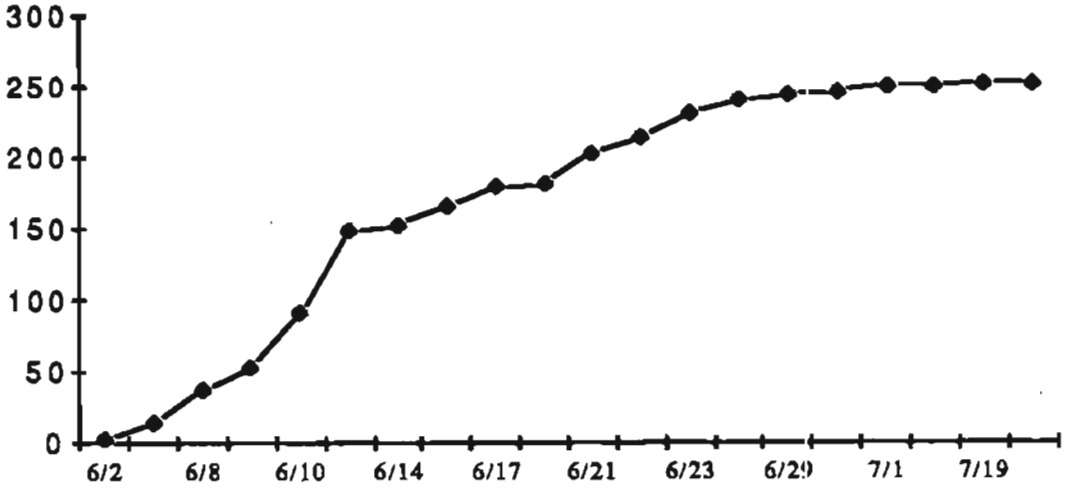

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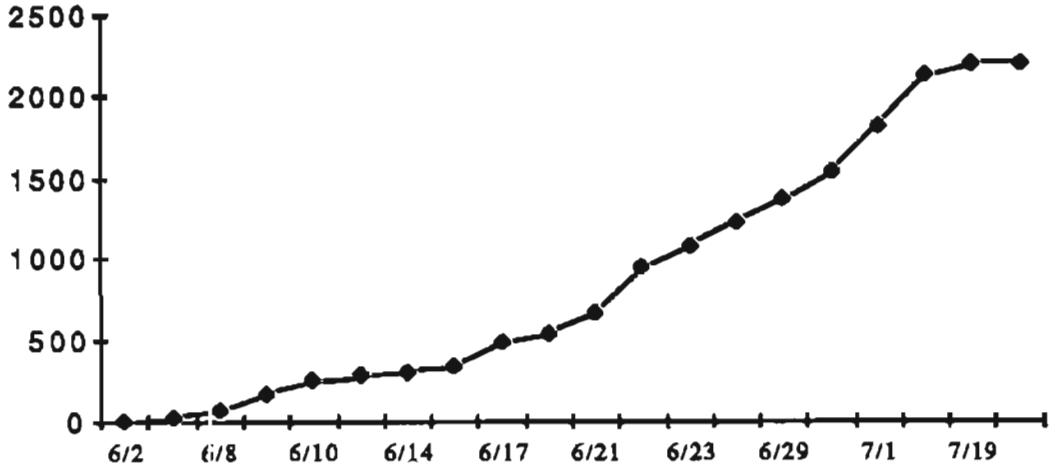

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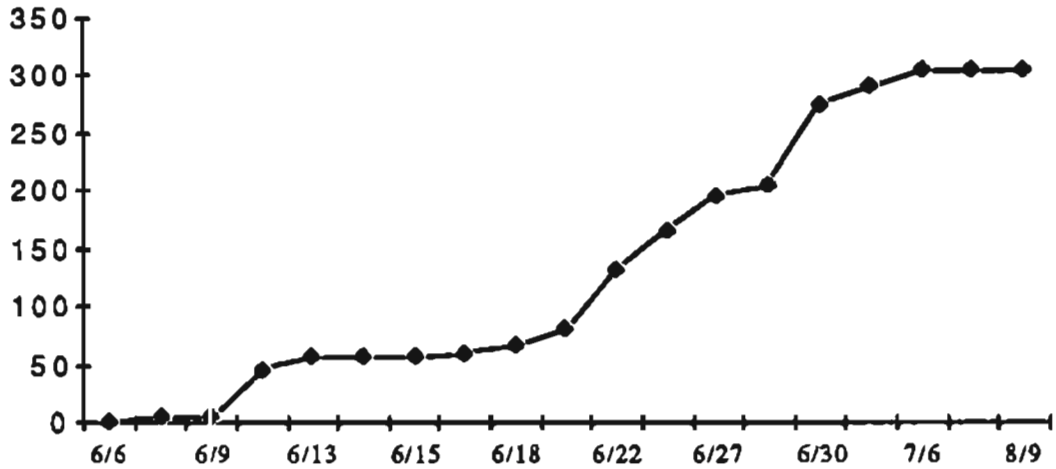
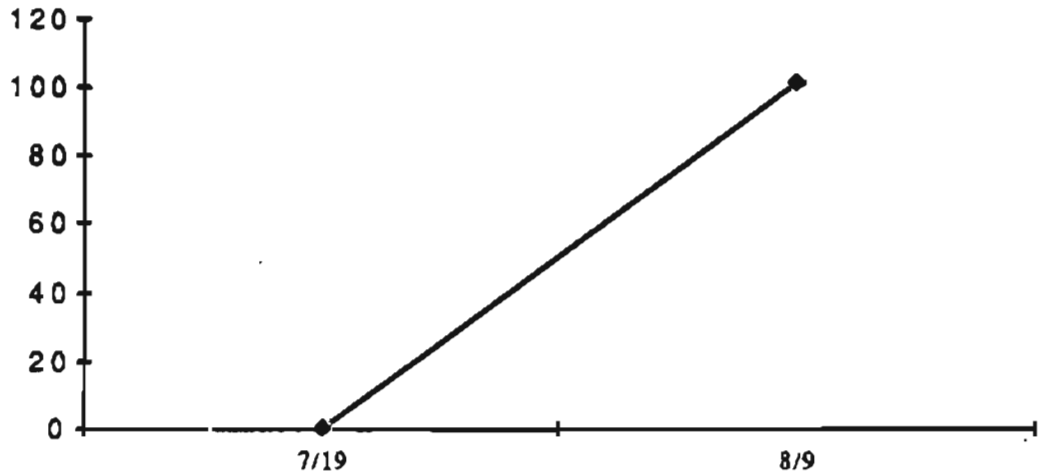
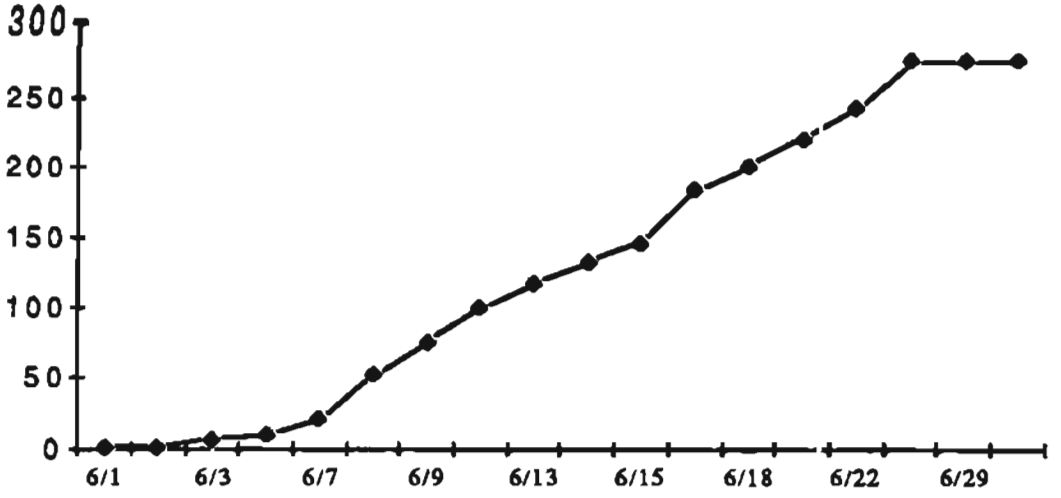


NAPASKIAK CUMULATIVE SILVER CPUE <=6



NAPASKIAK CUMULATIVE KING CPUE >5



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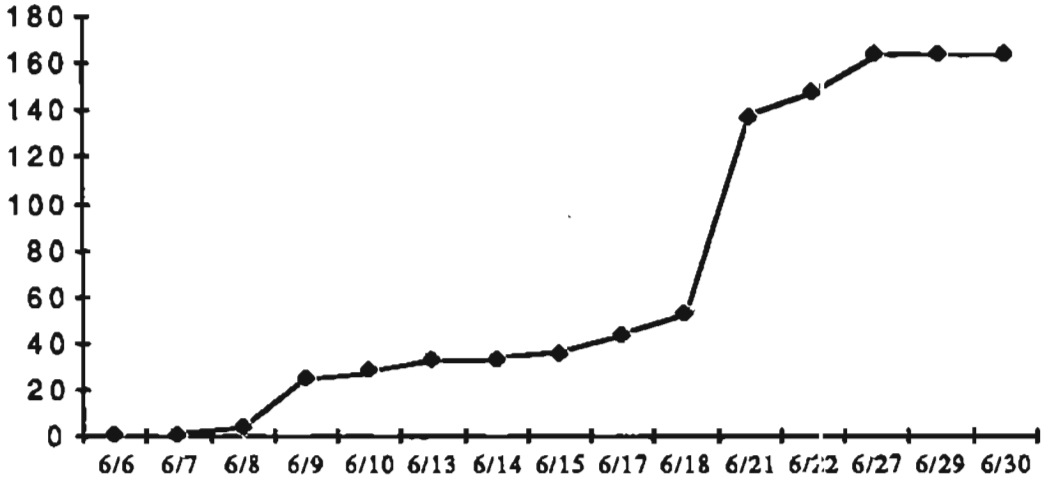

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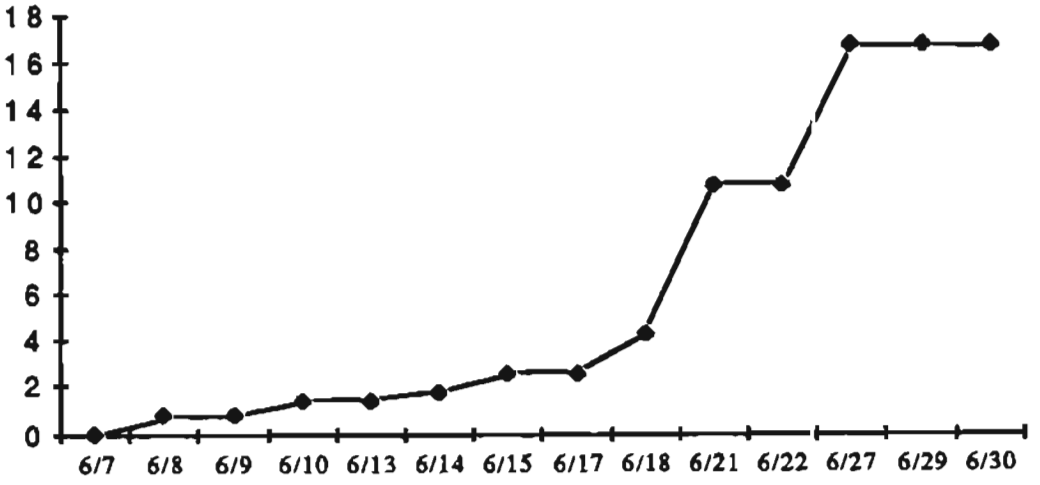
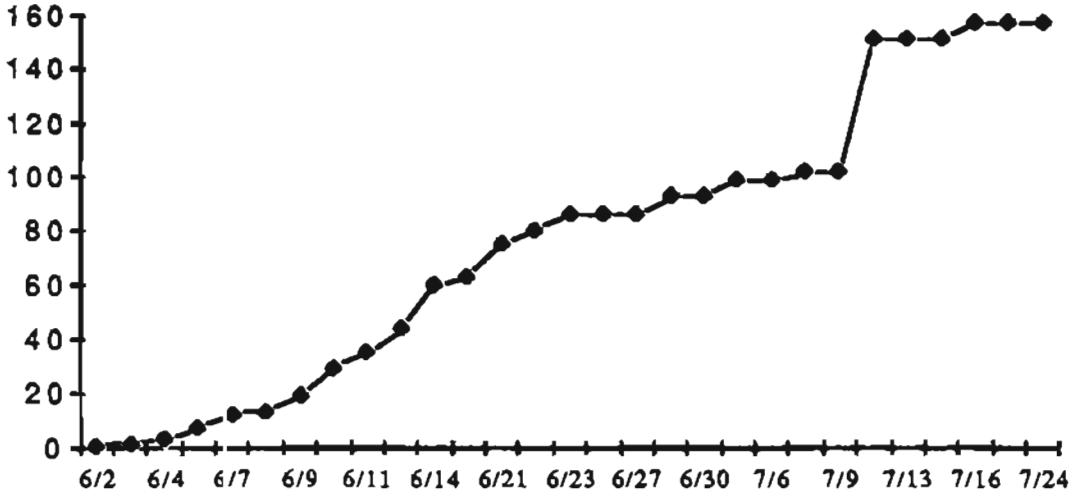
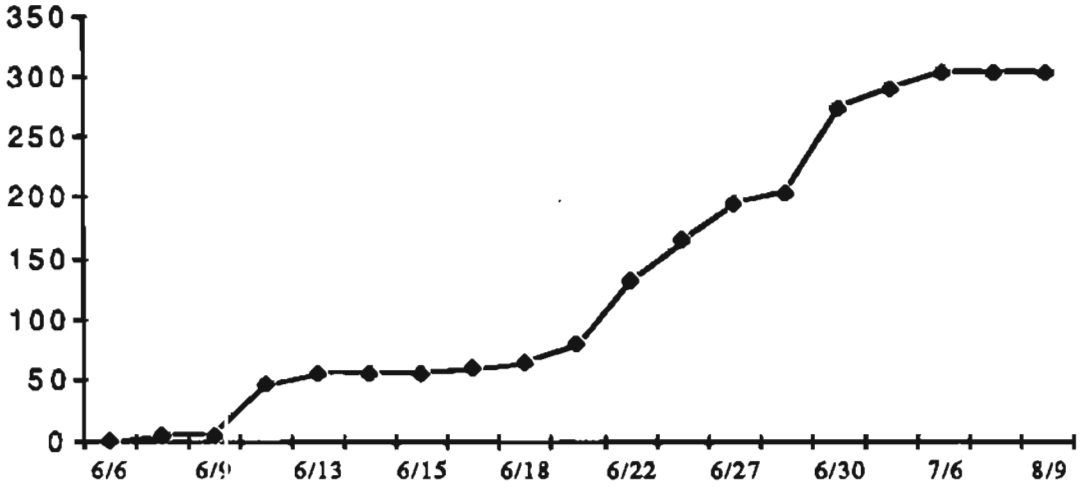


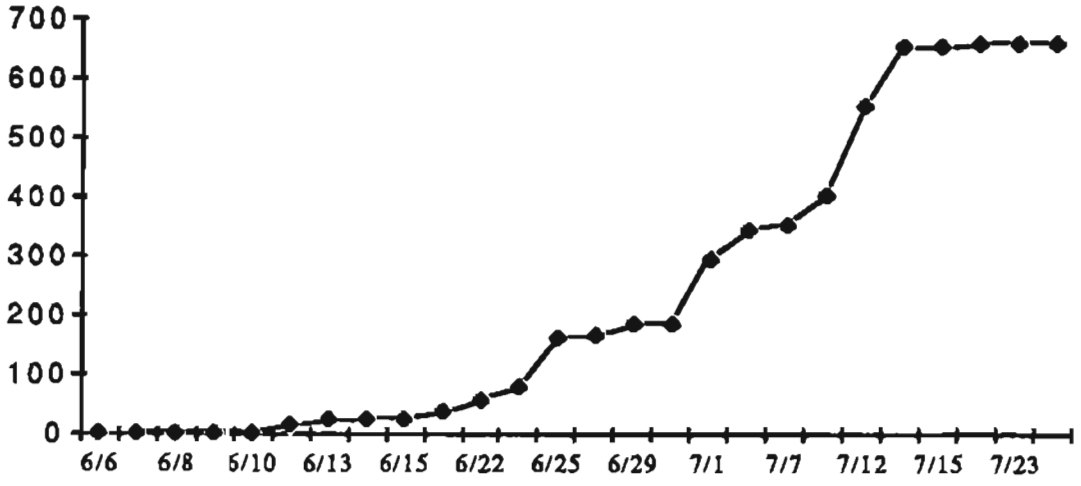
NICK FISHCAMP CUMULATIVE KING CPUE <=6



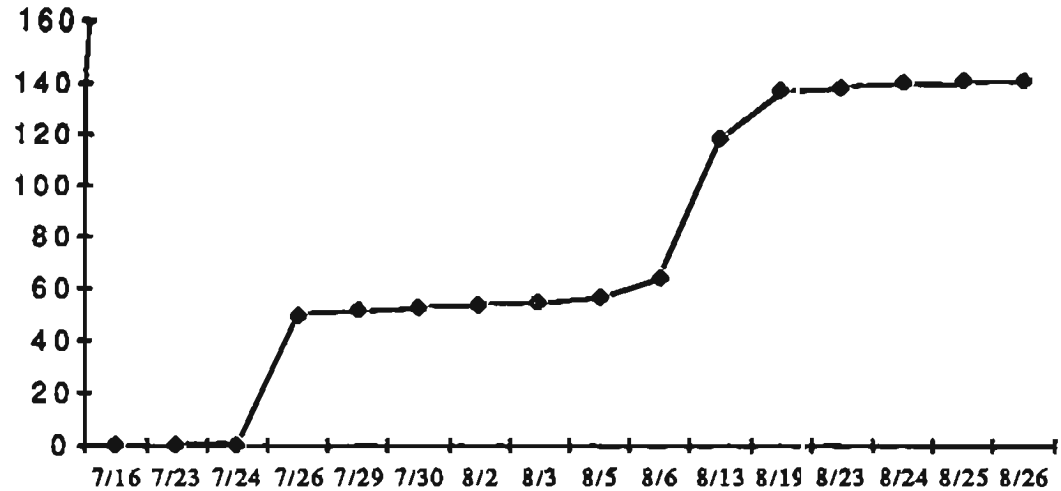
NICK FISHCAMP CUMULATIVE CHUM CPUE <=6



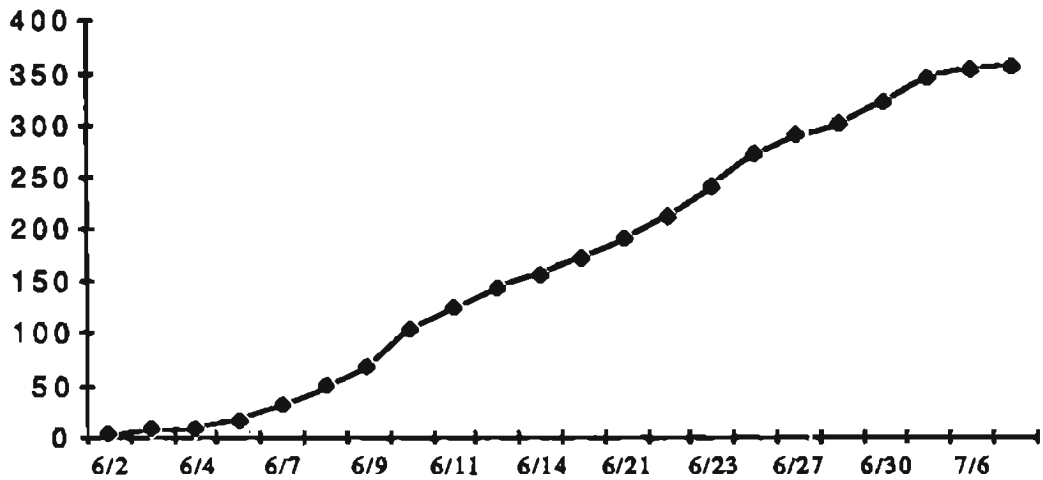
NICK FISHCAMP CUMULATIVE RED CPUE <=6



NICK FISHCAMP CUMULATIVE SILVER CPUE<=6



NICK FISHCAMP CUMULATIVE KING CPUE >6



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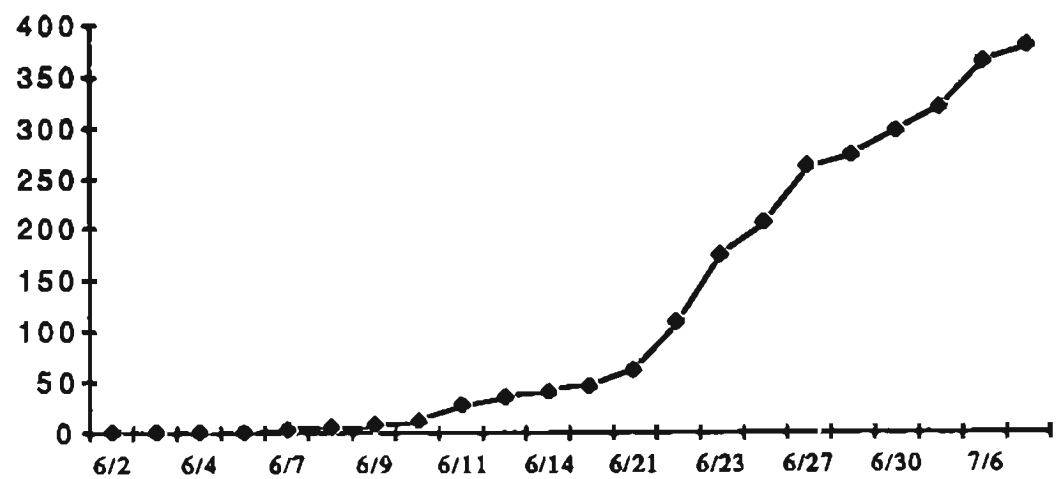

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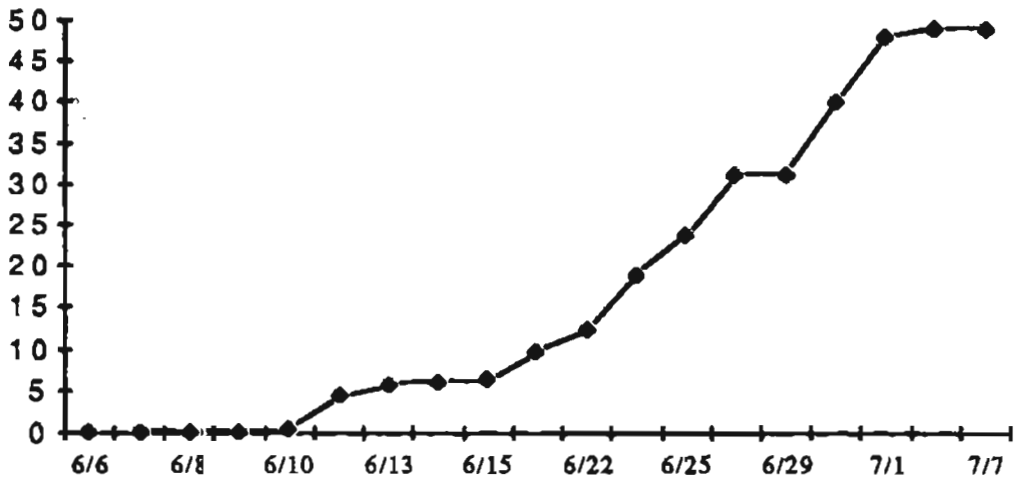
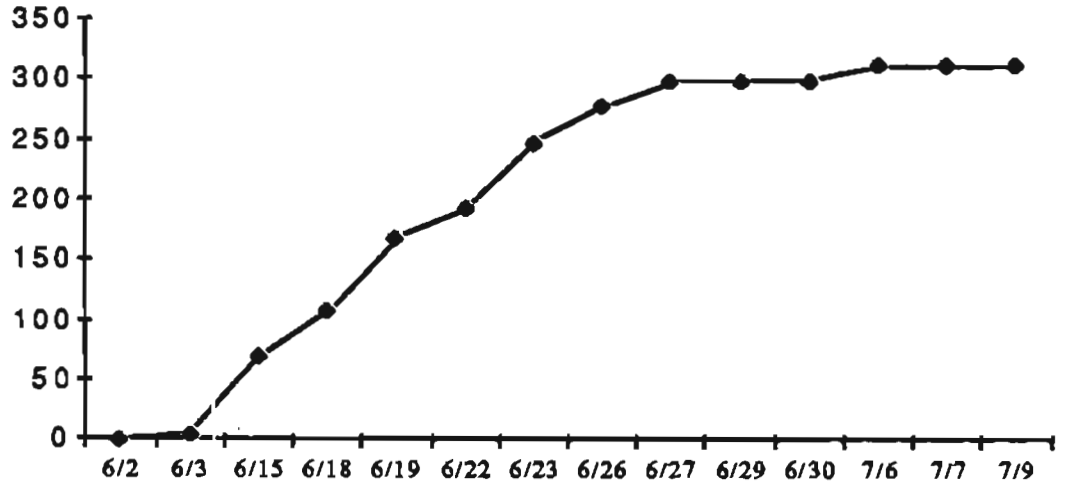


BETHEL CUMULATIVE KING CPUE <=6



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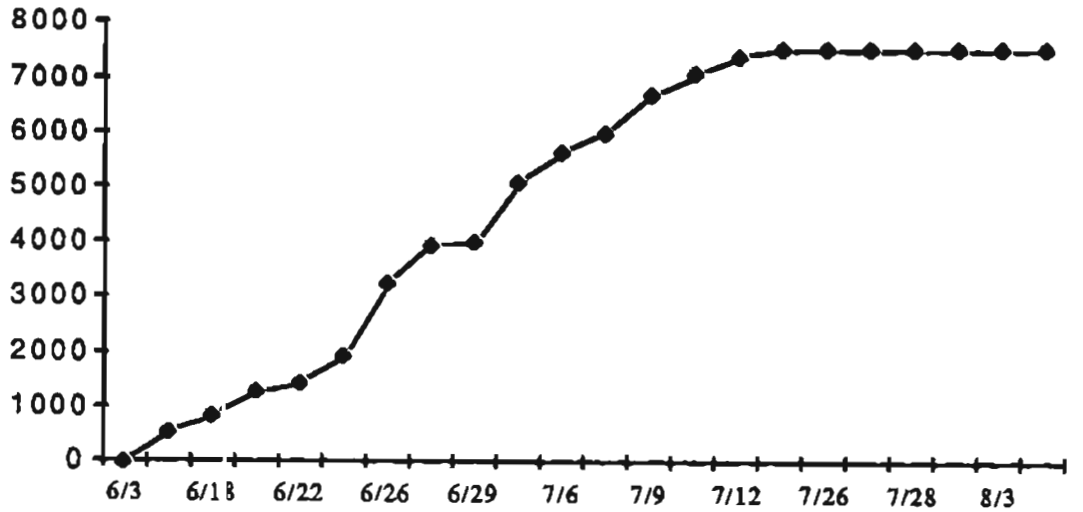

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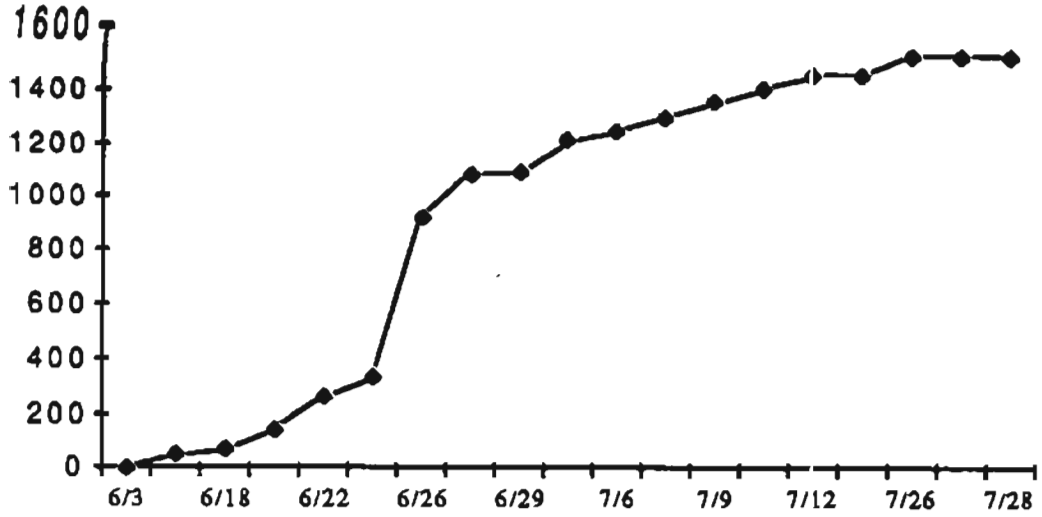

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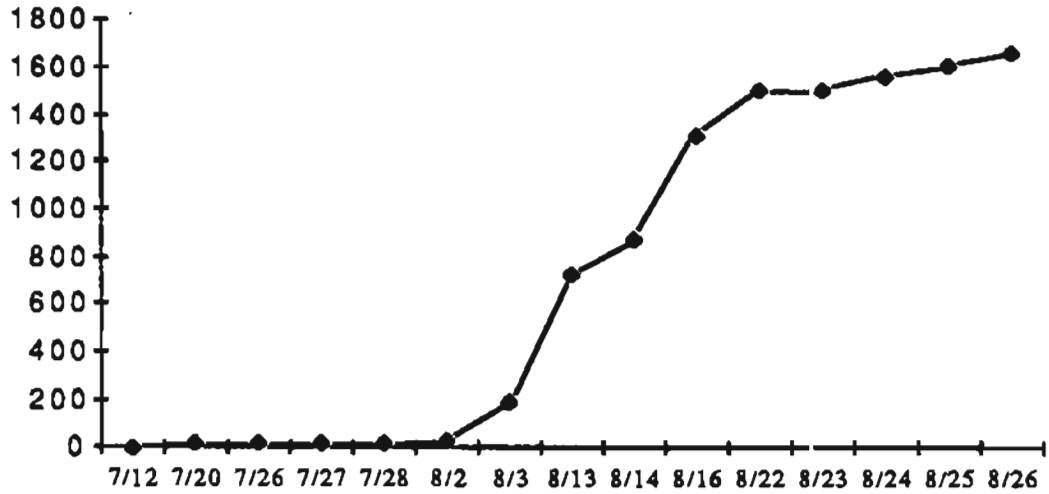

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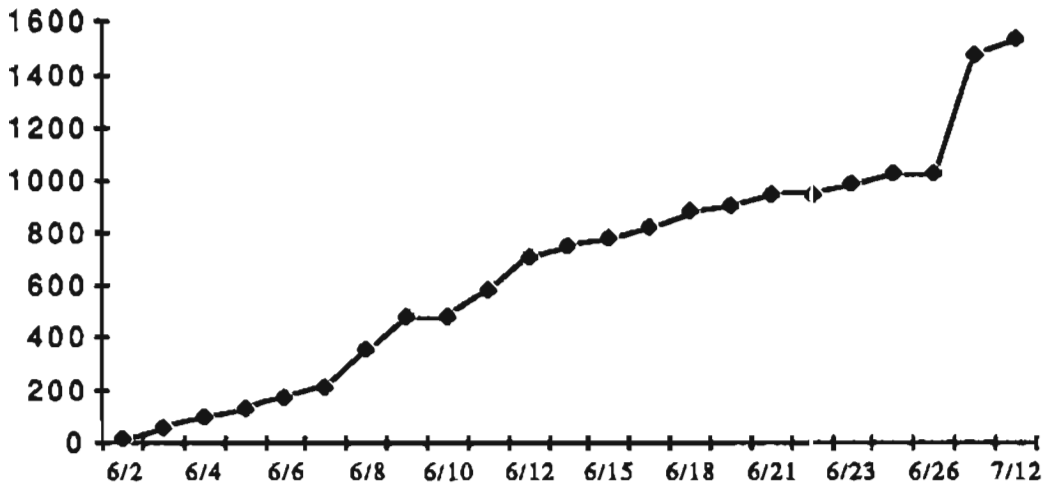

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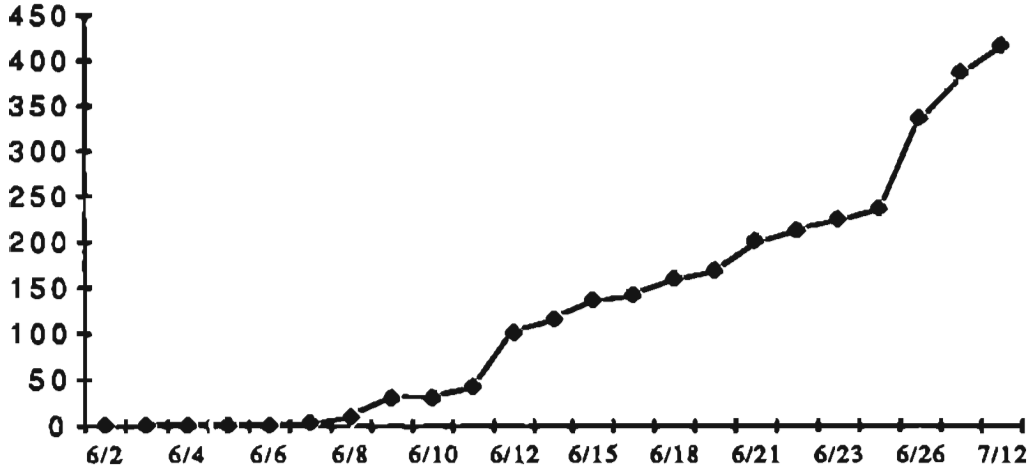

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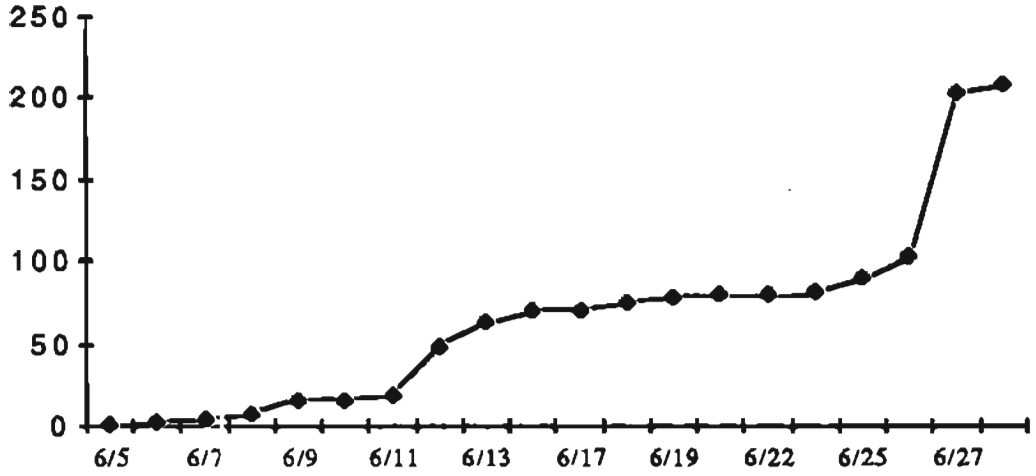

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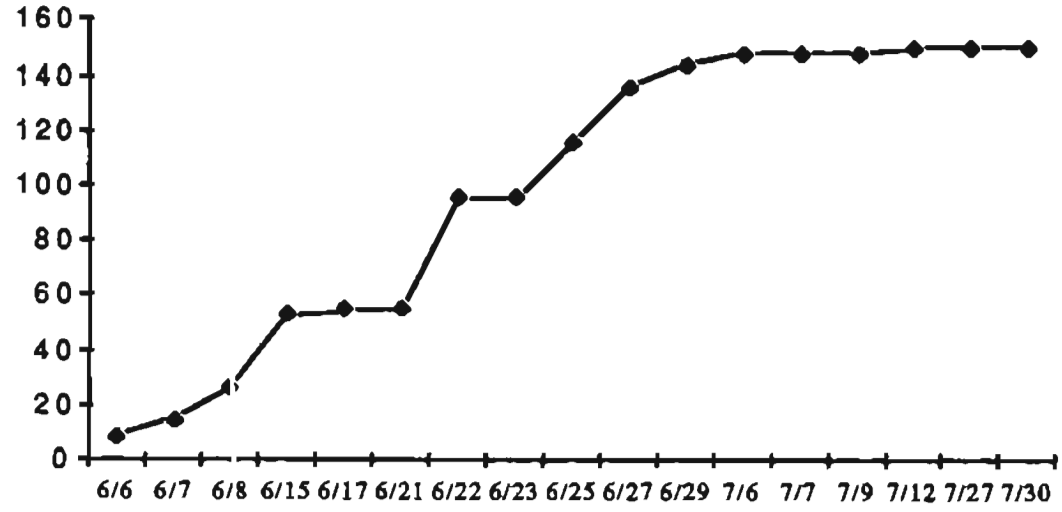

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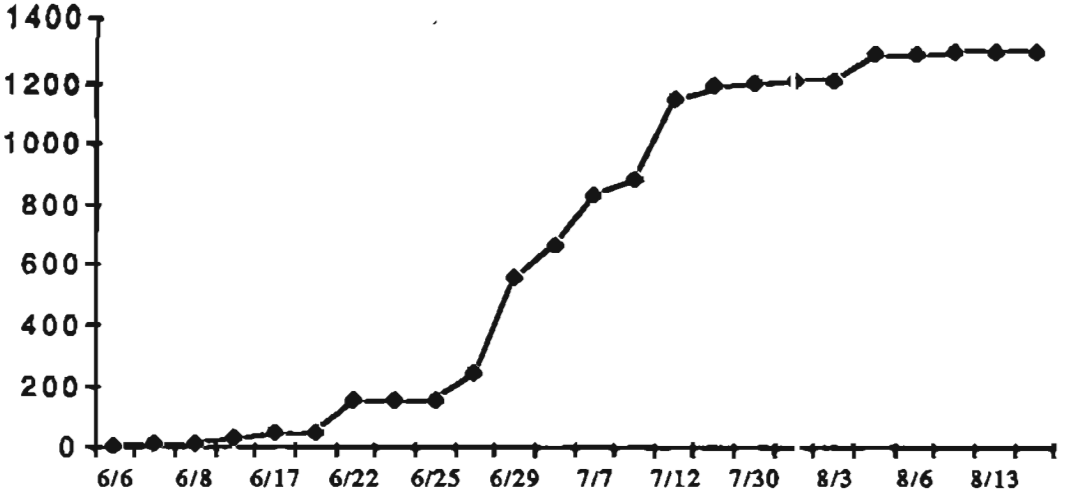

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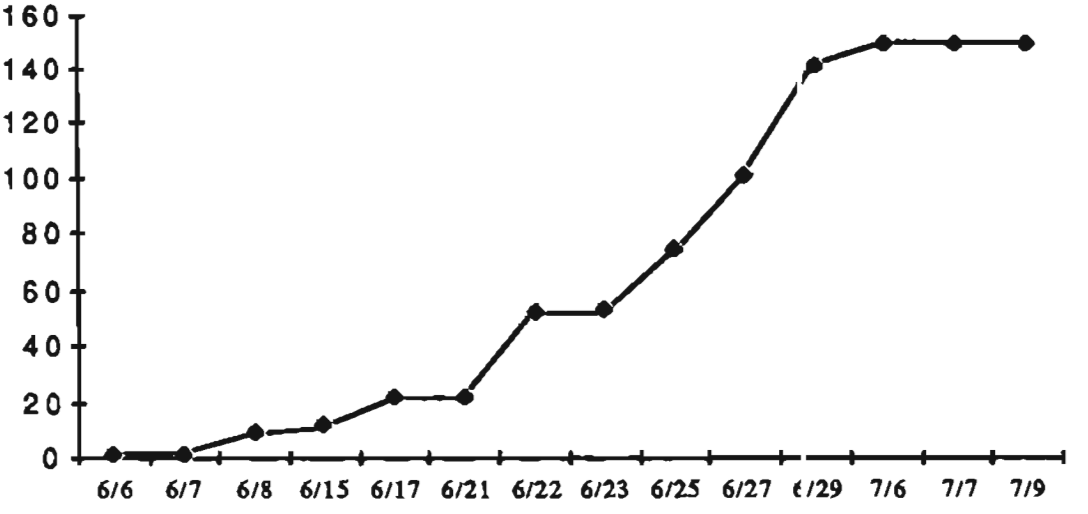

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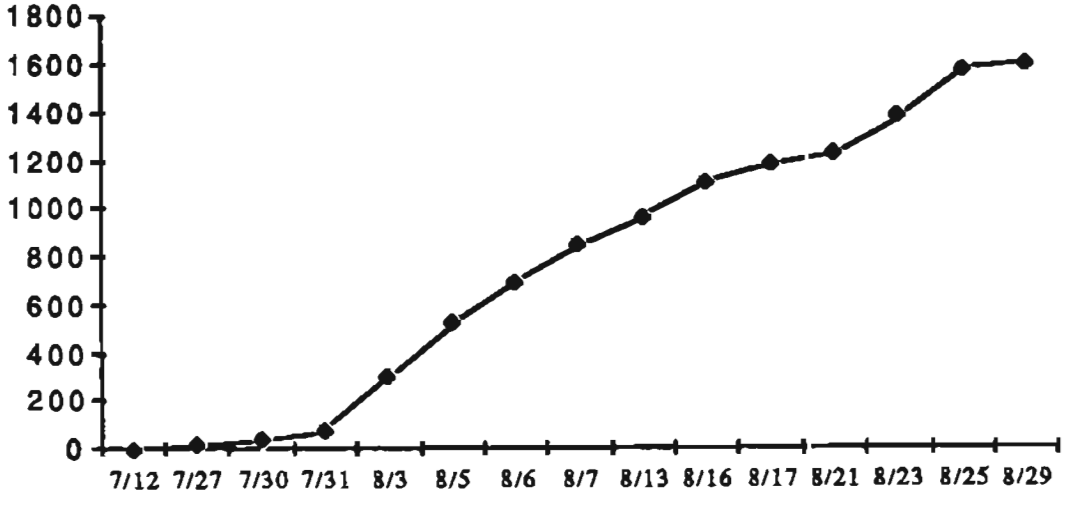

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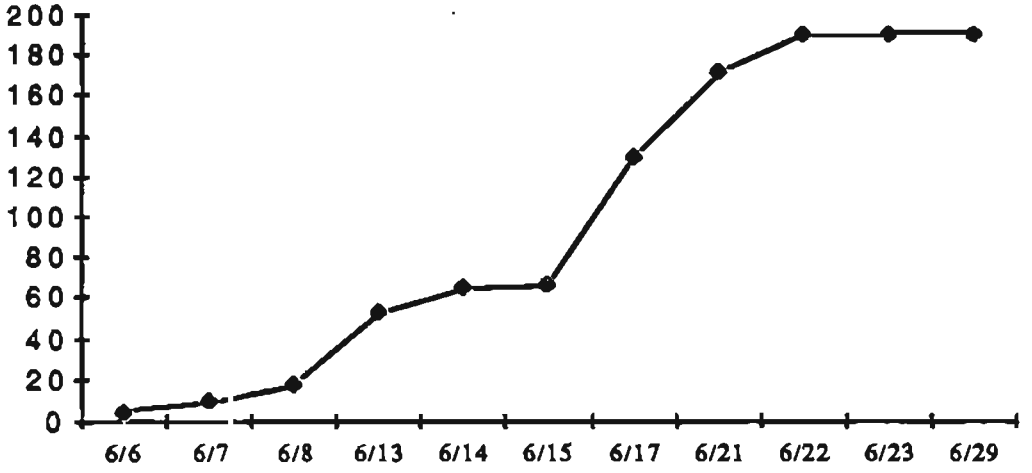

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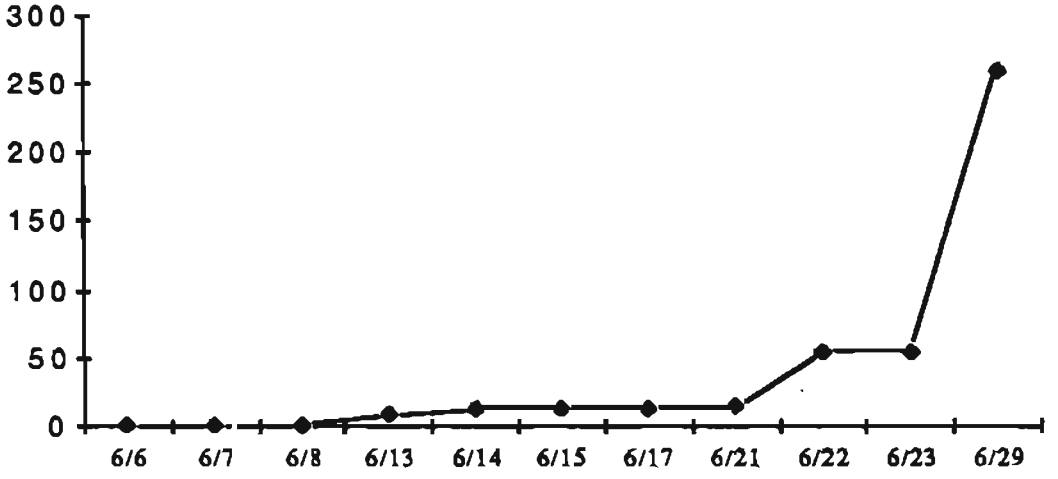

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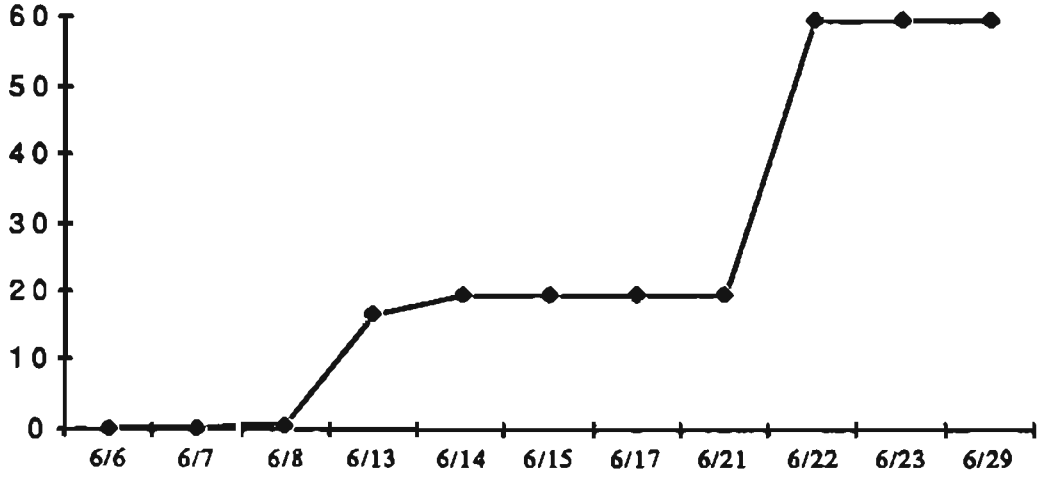

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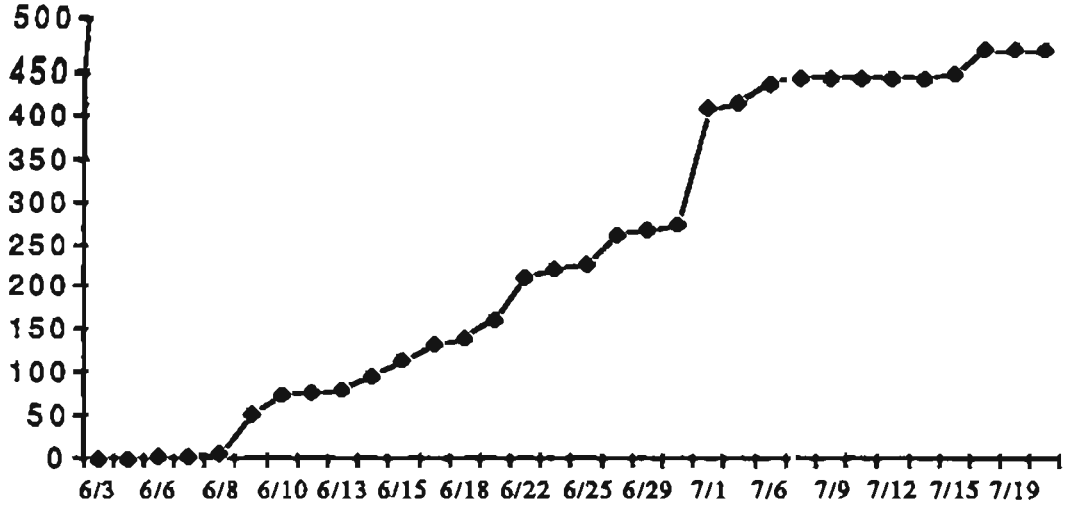

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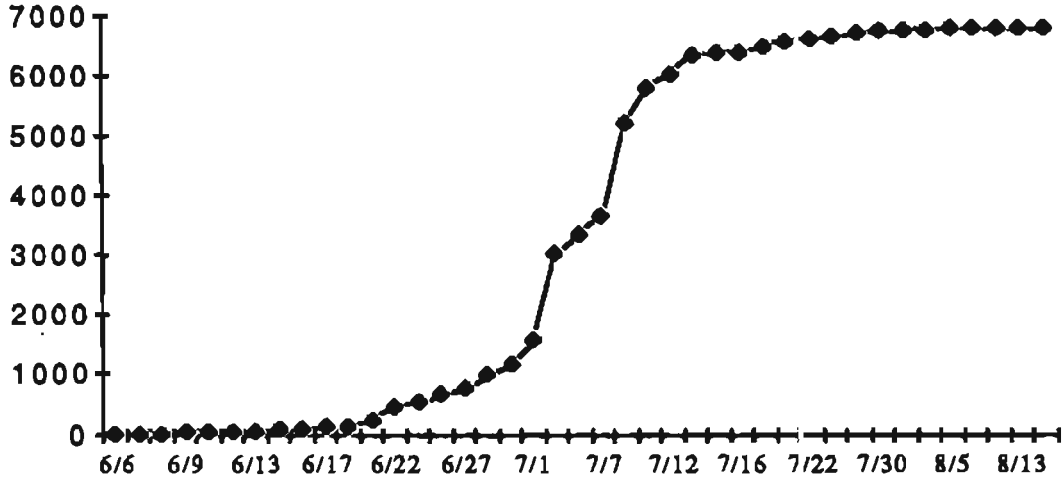

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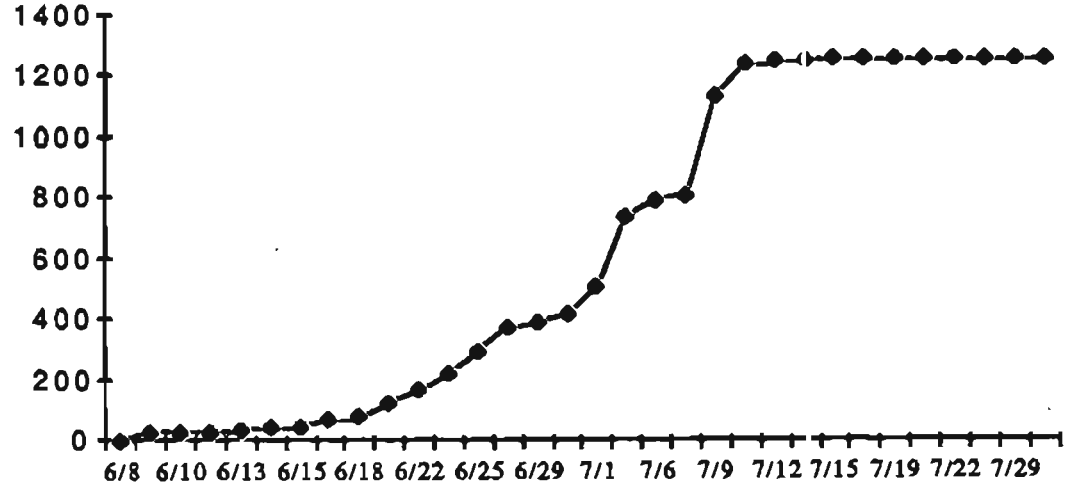

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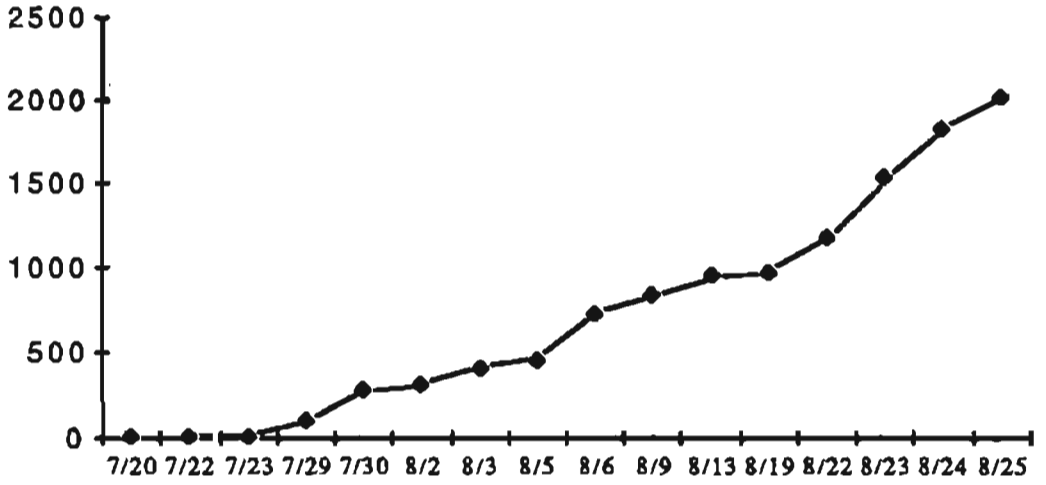

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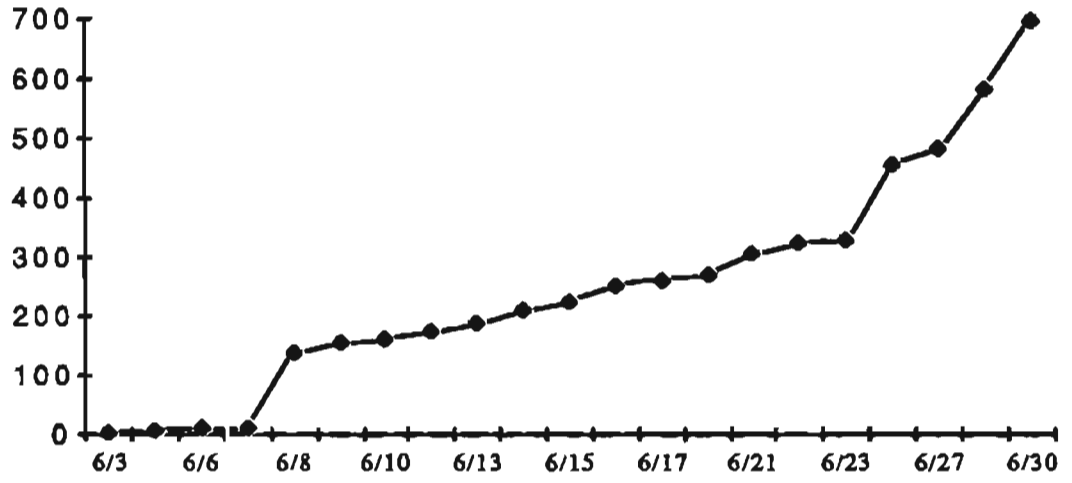

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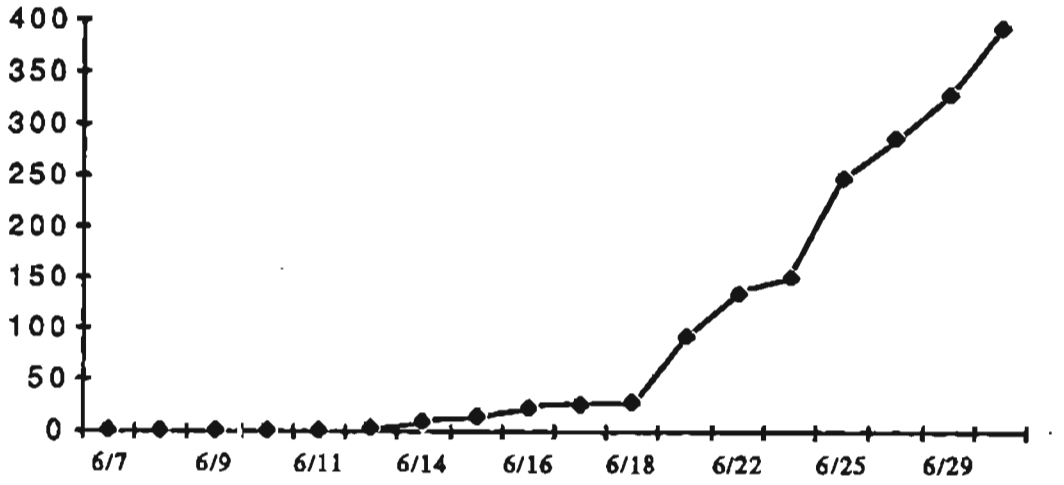

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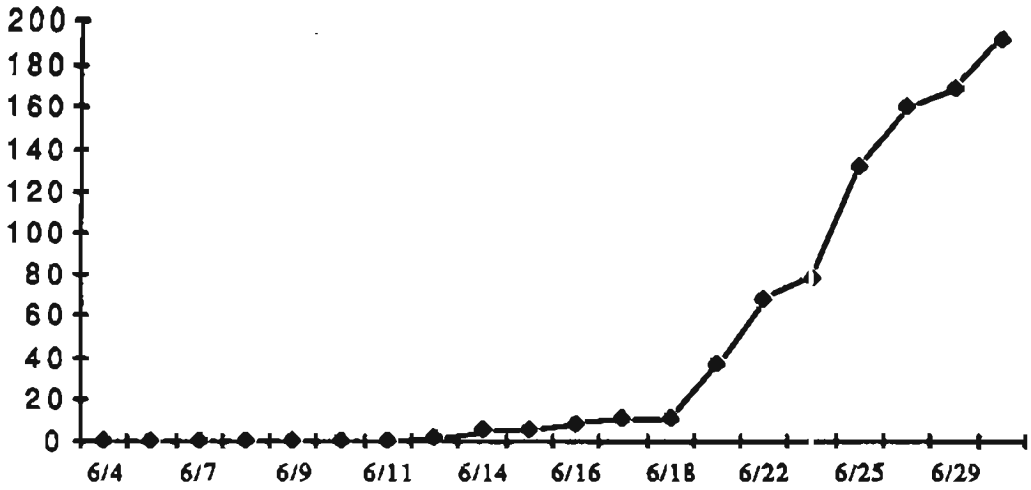

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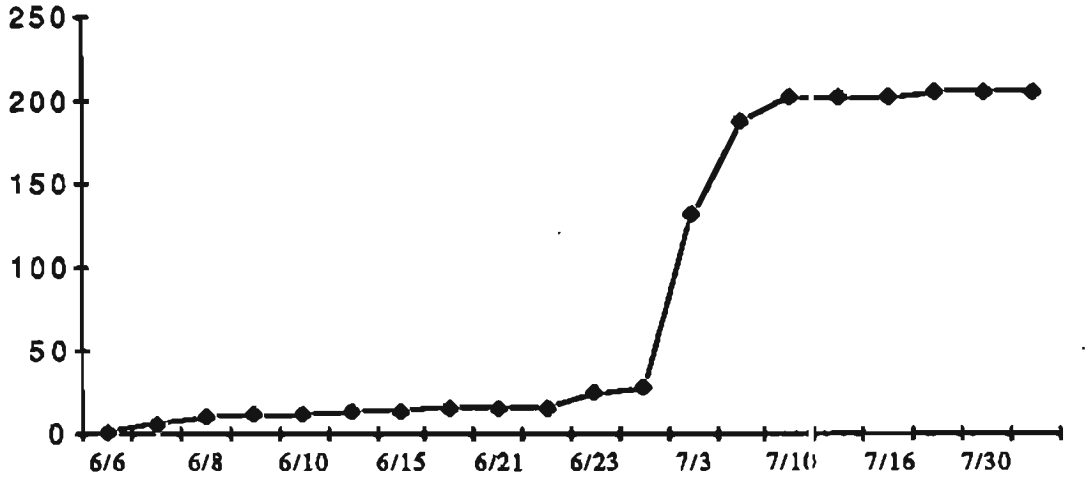

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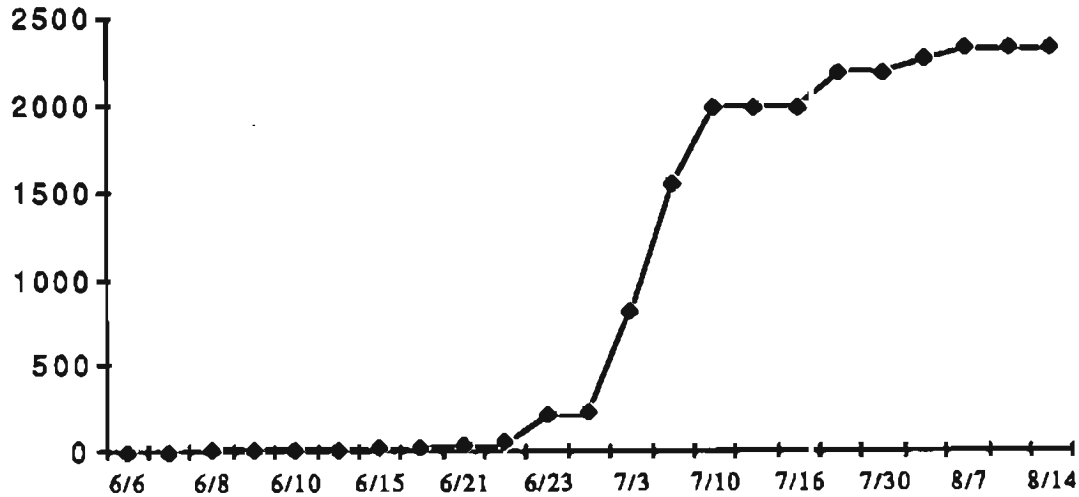

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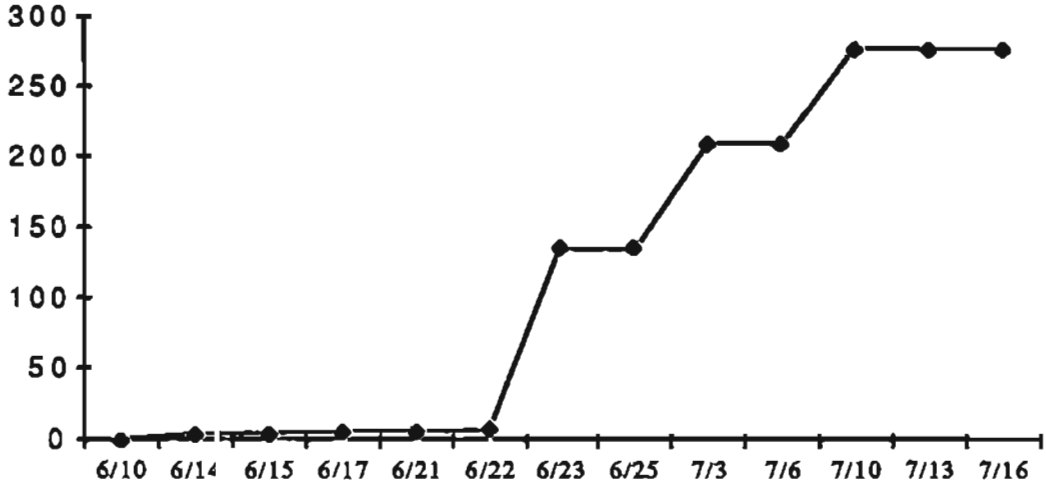

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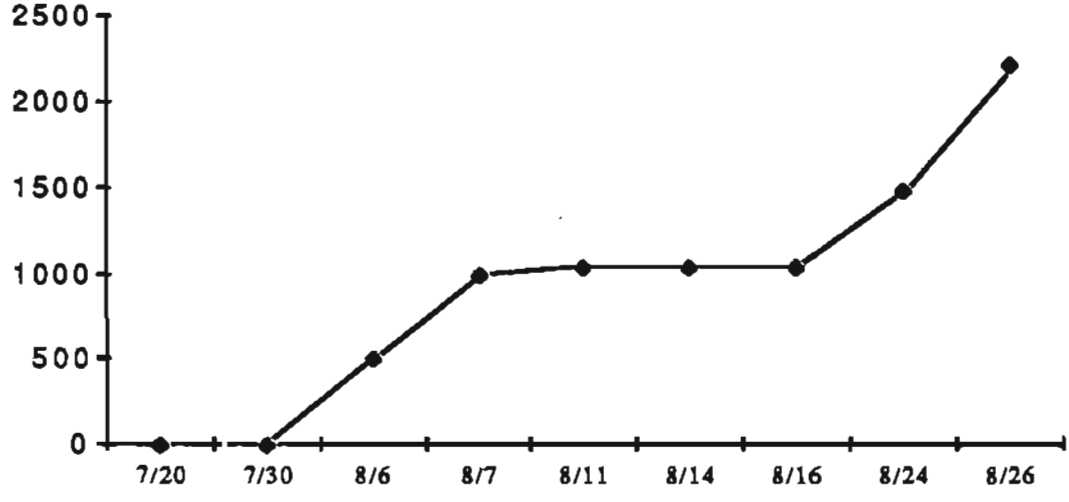

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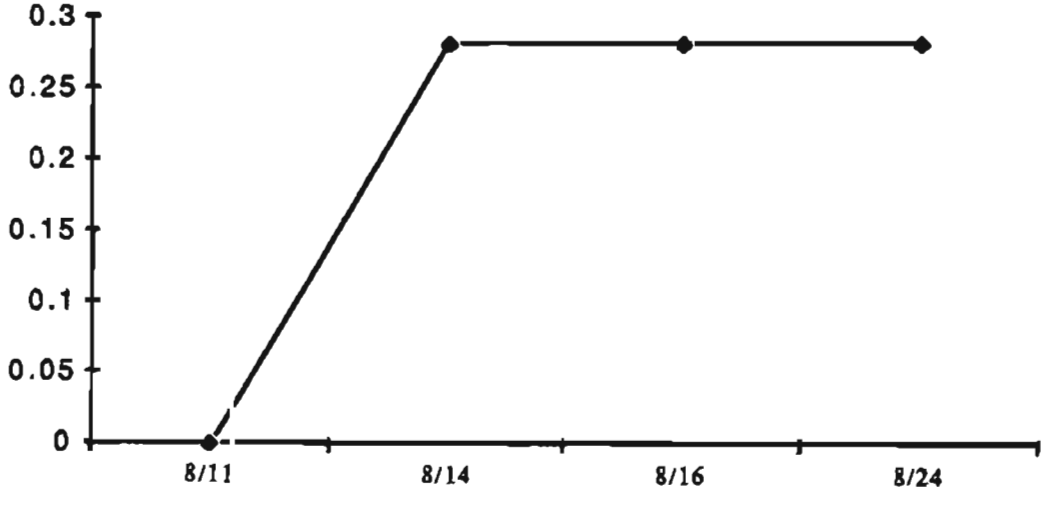

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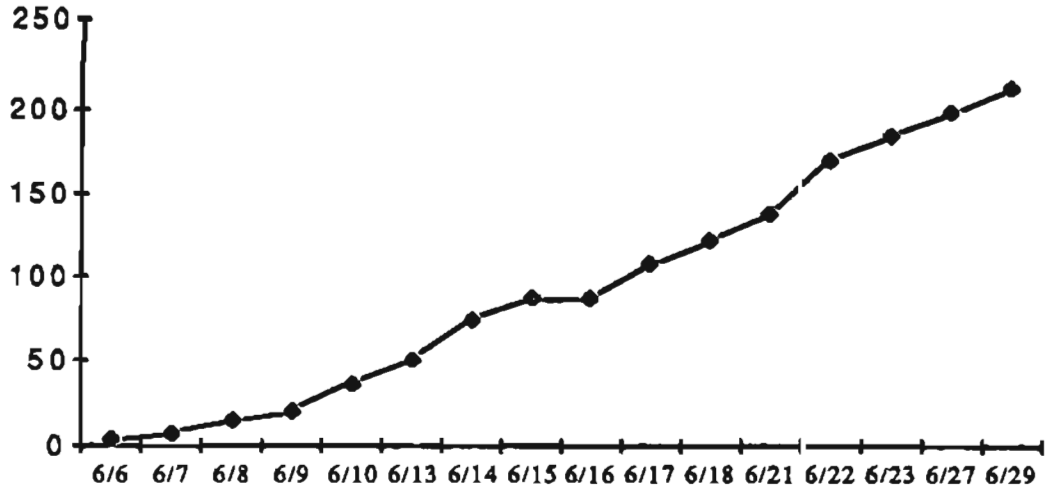

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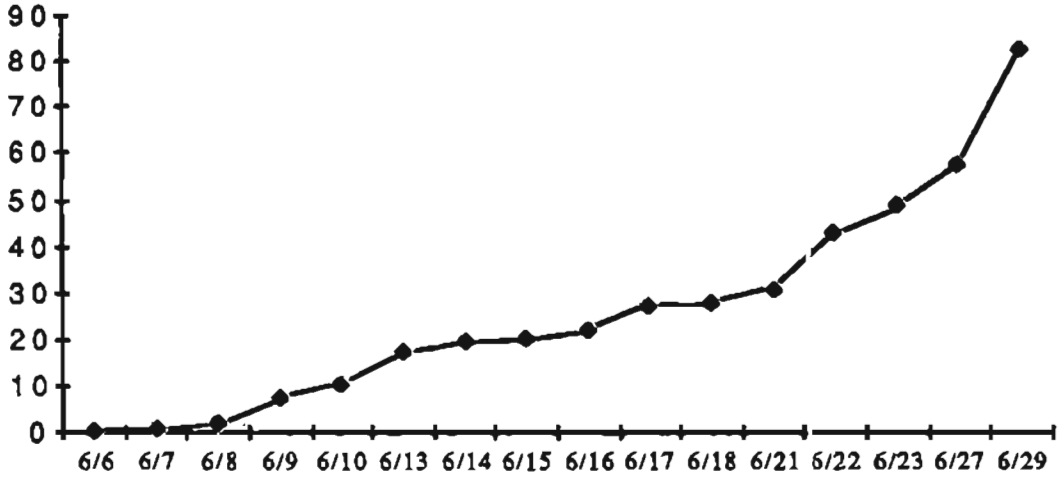

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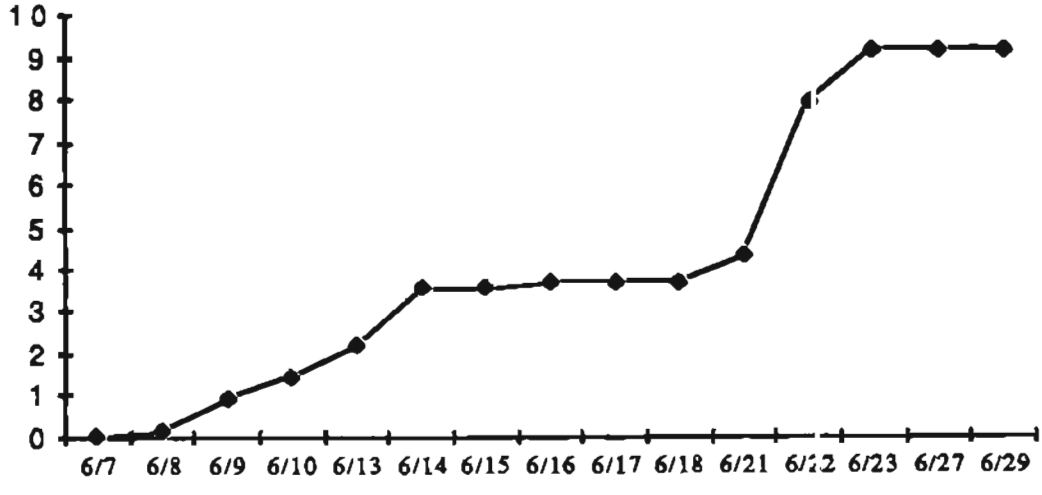

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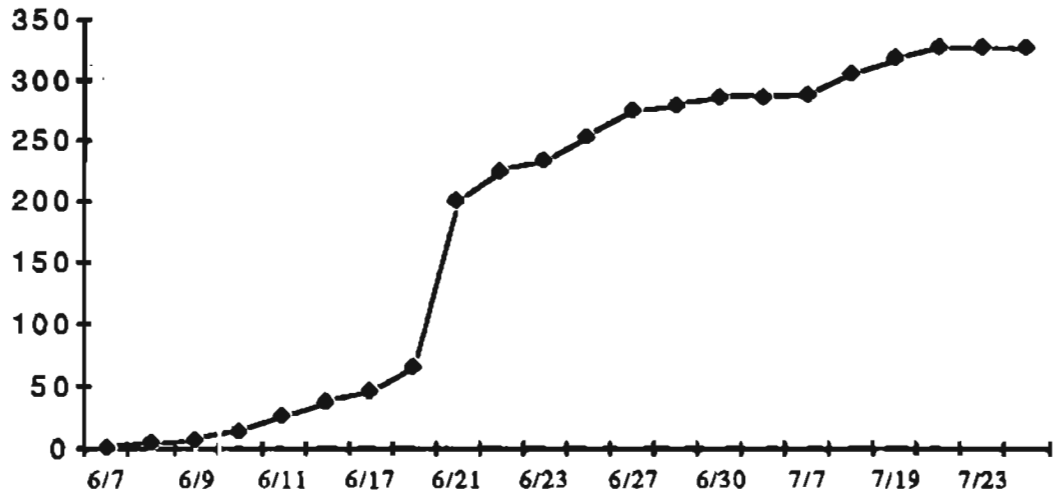

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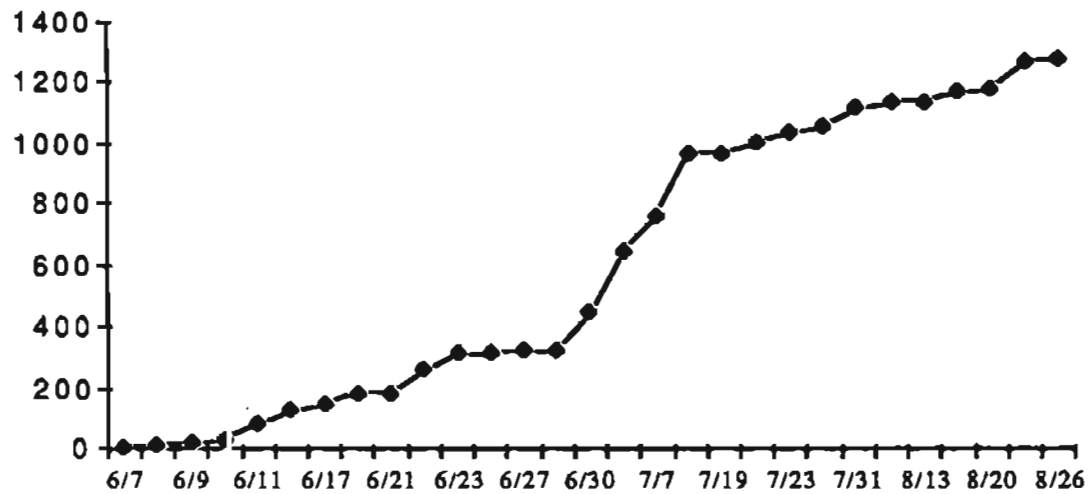

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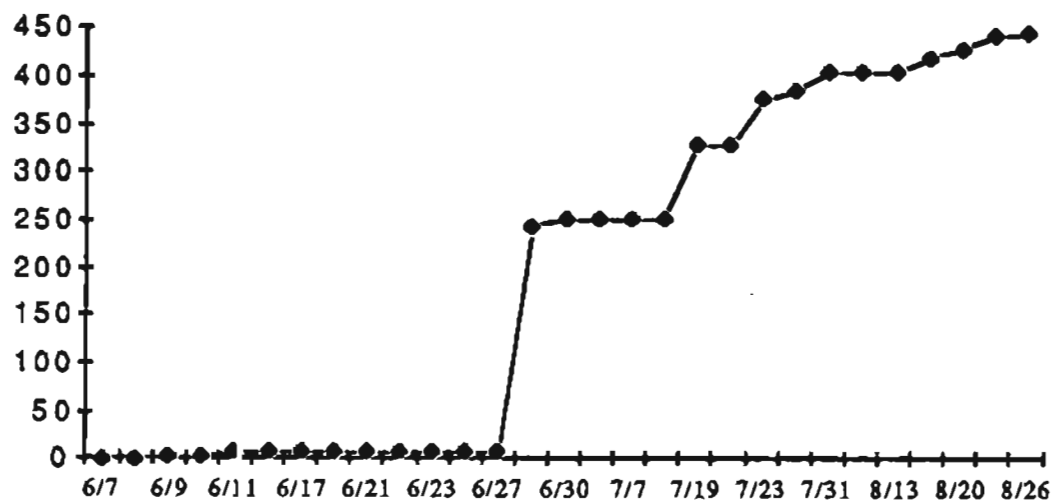

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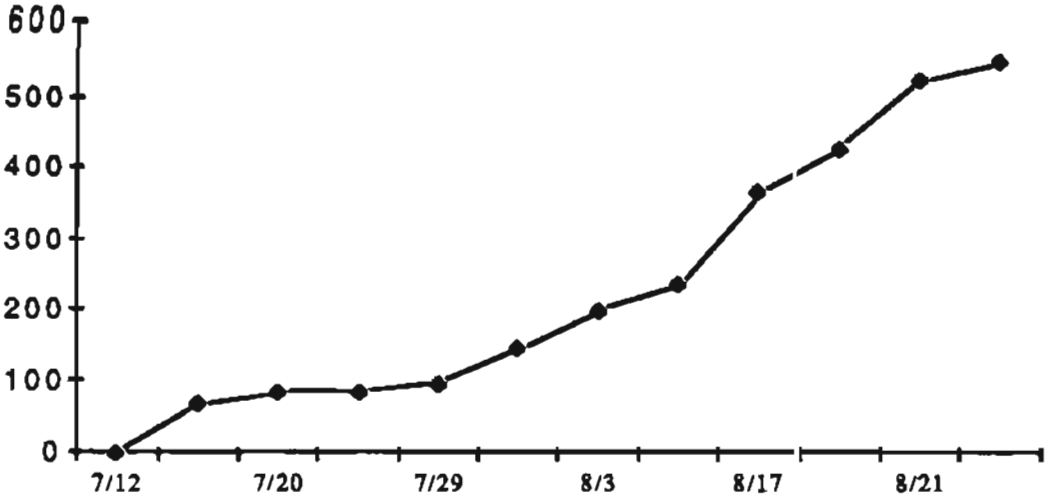

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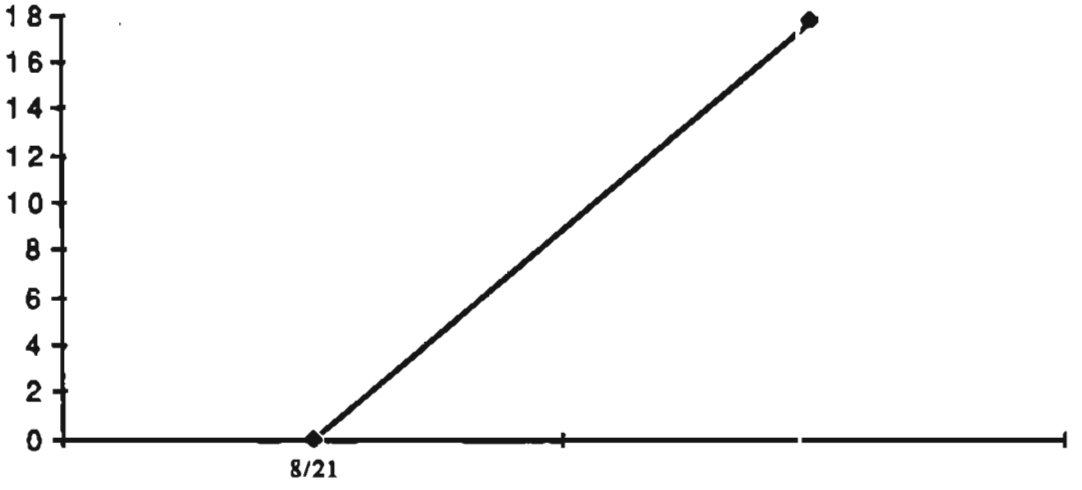

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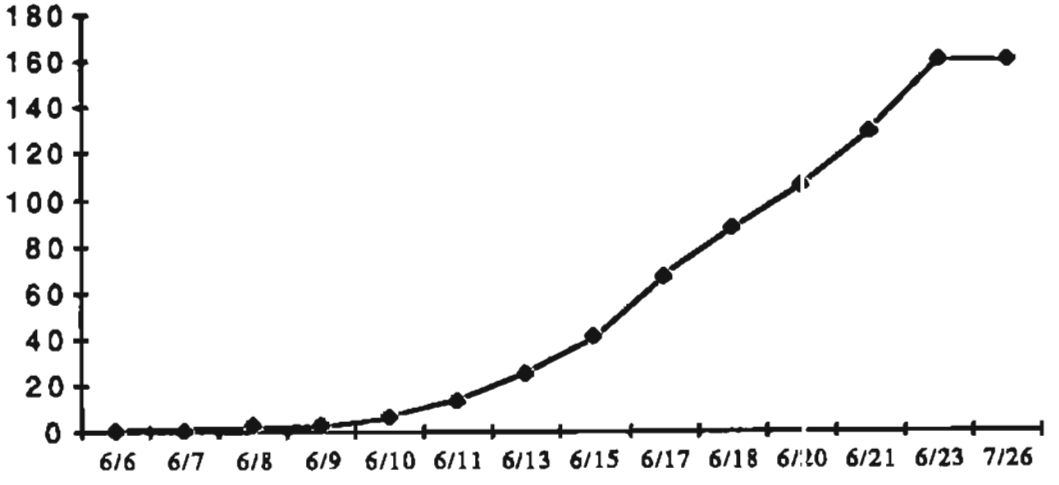

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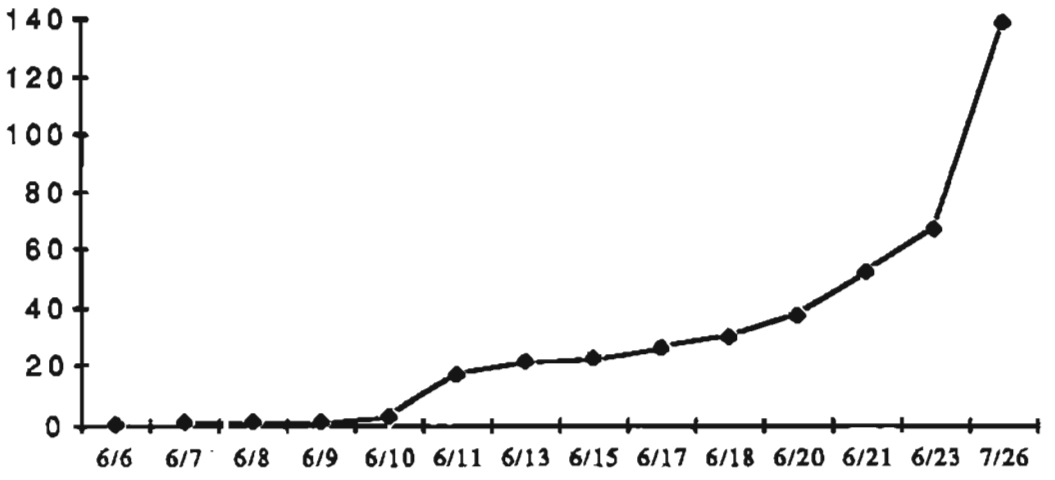

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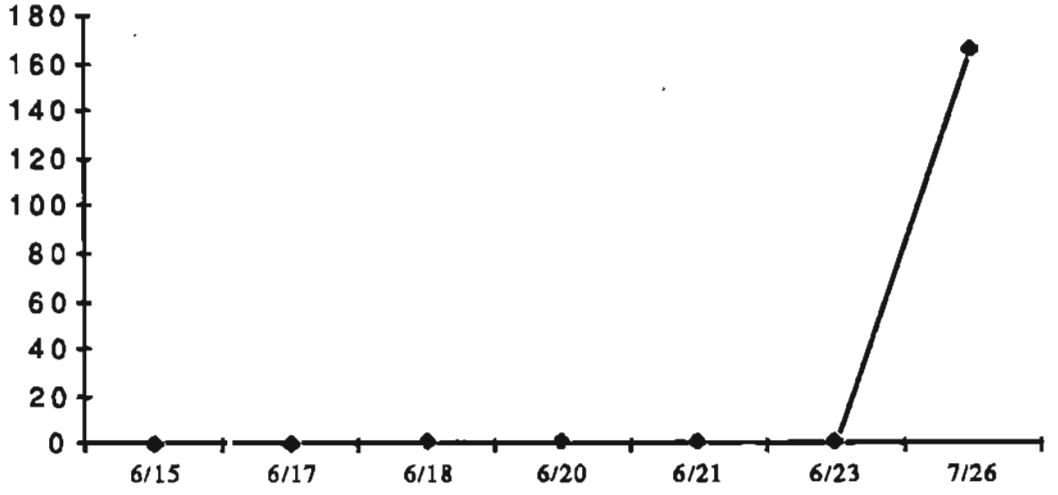

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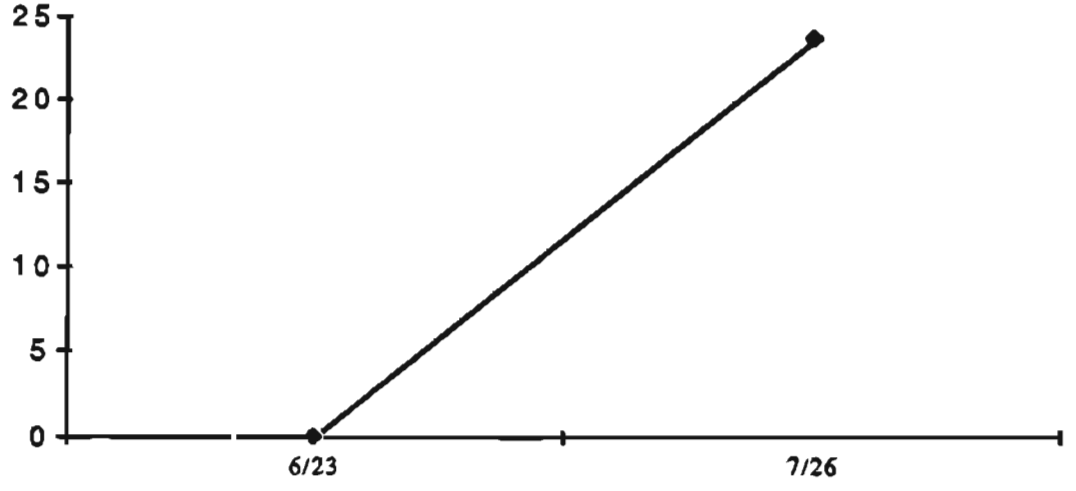

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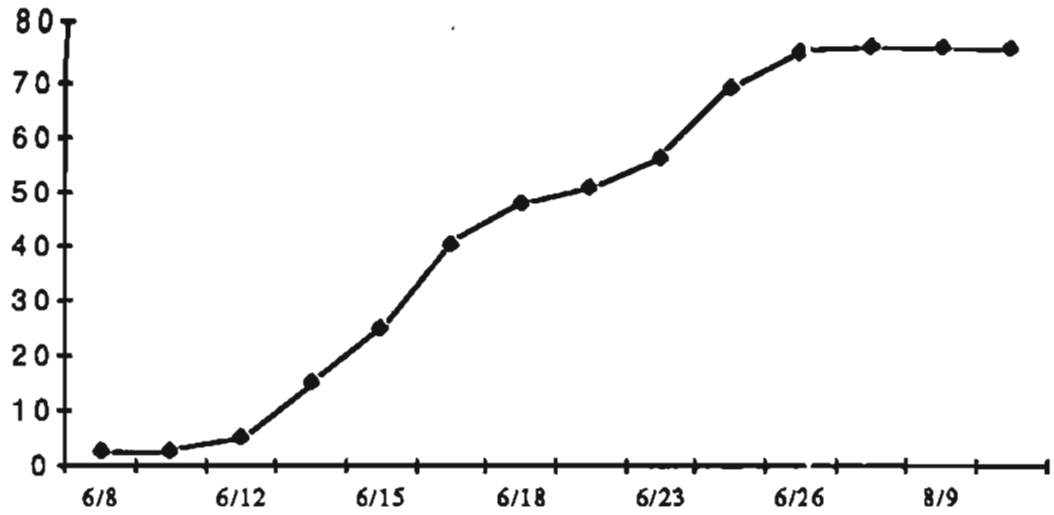

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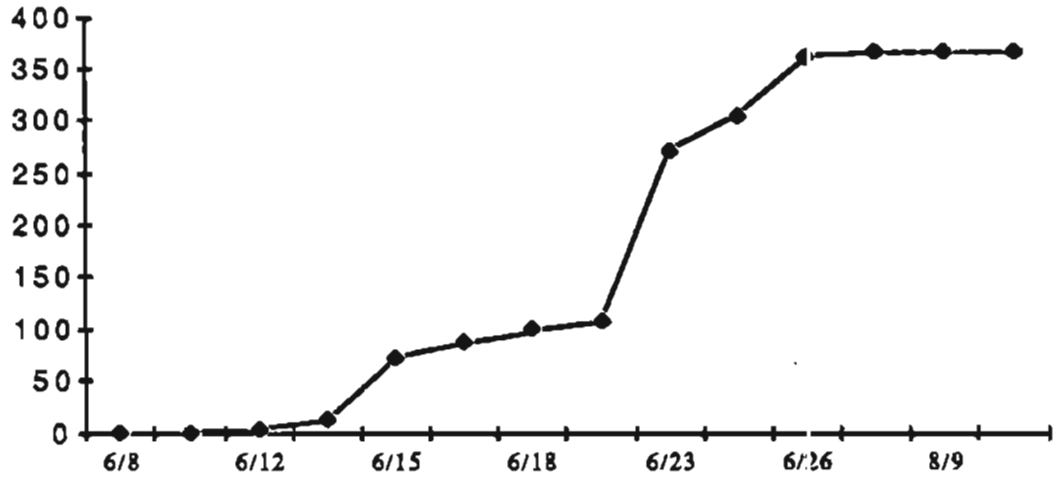

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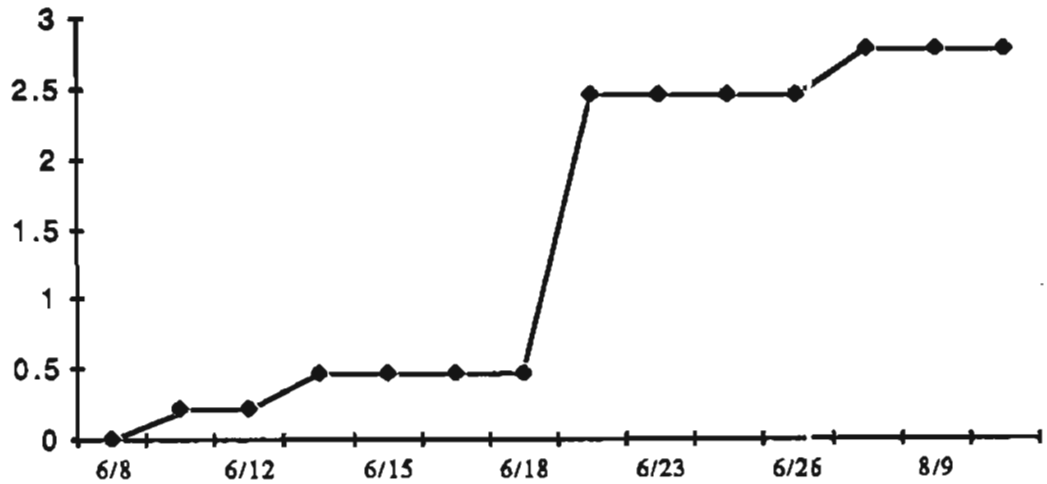

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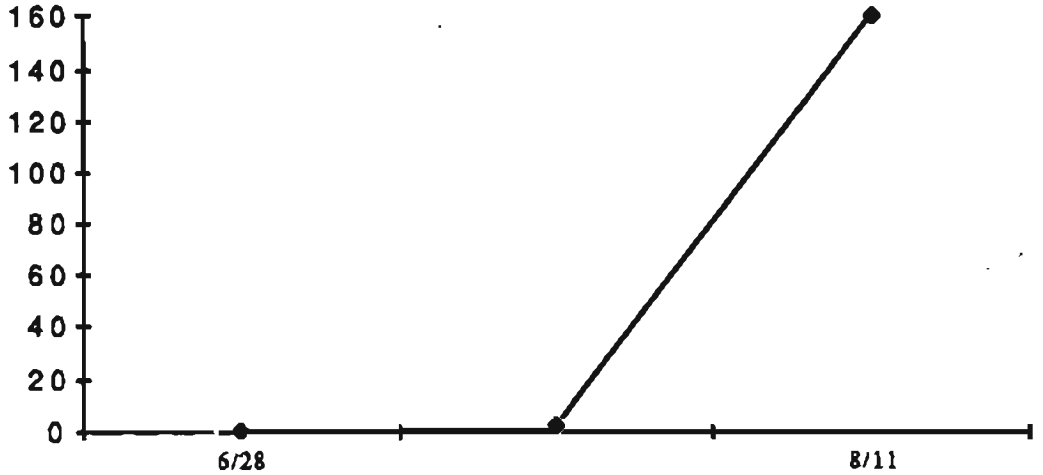

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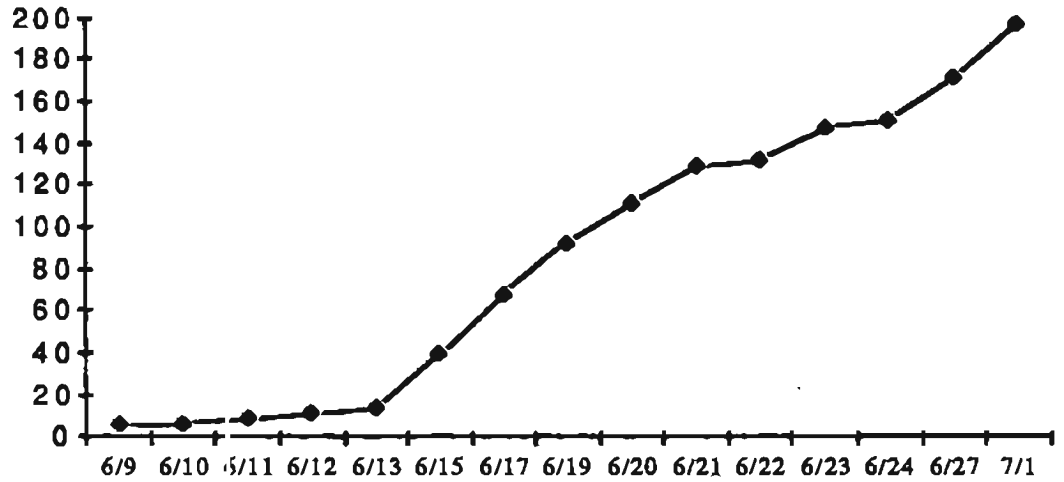

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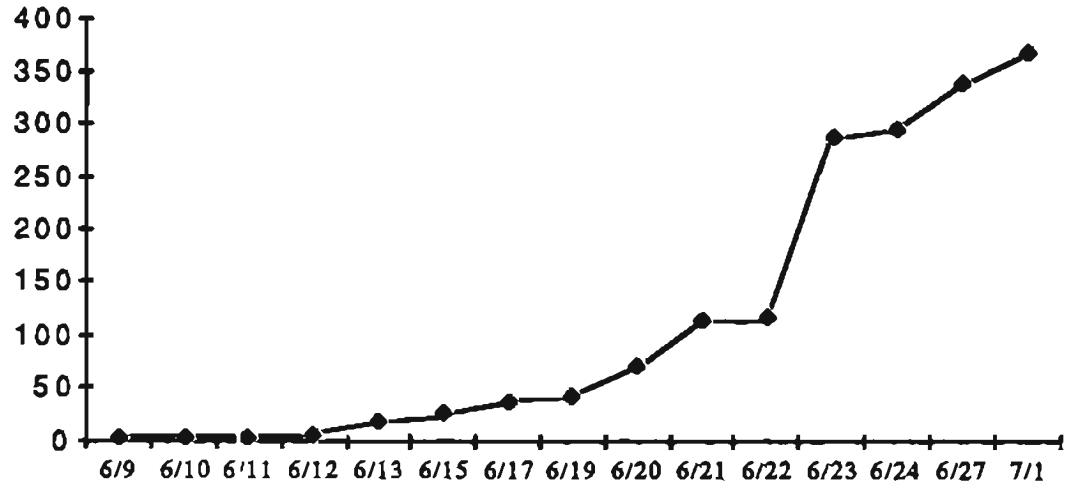

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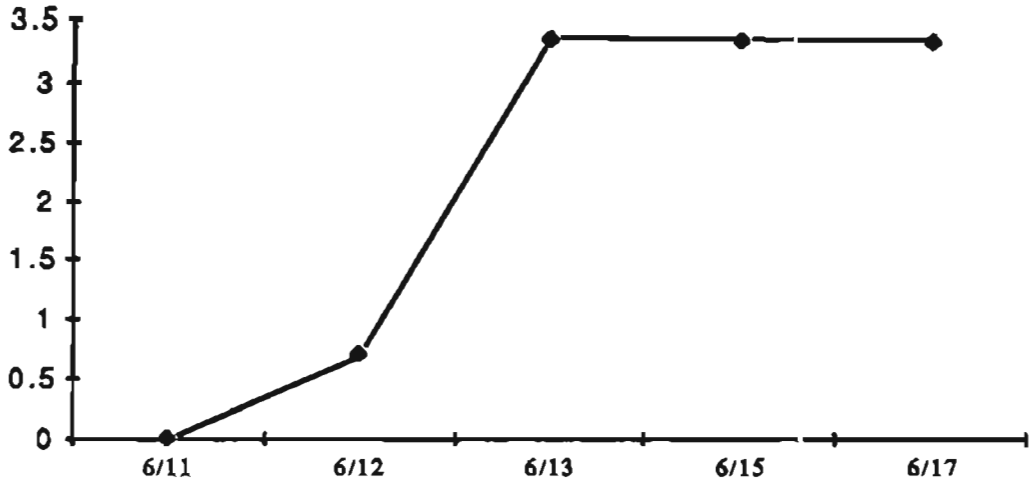

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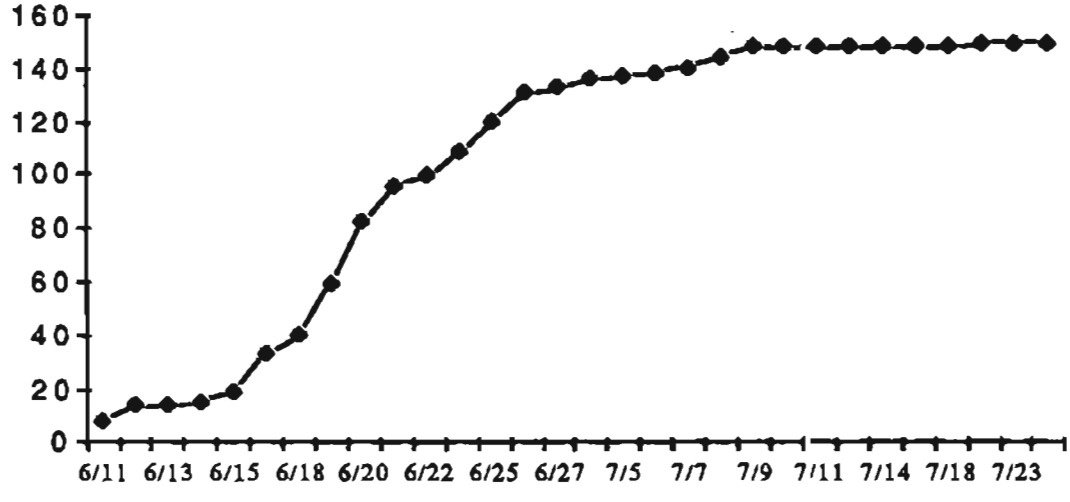

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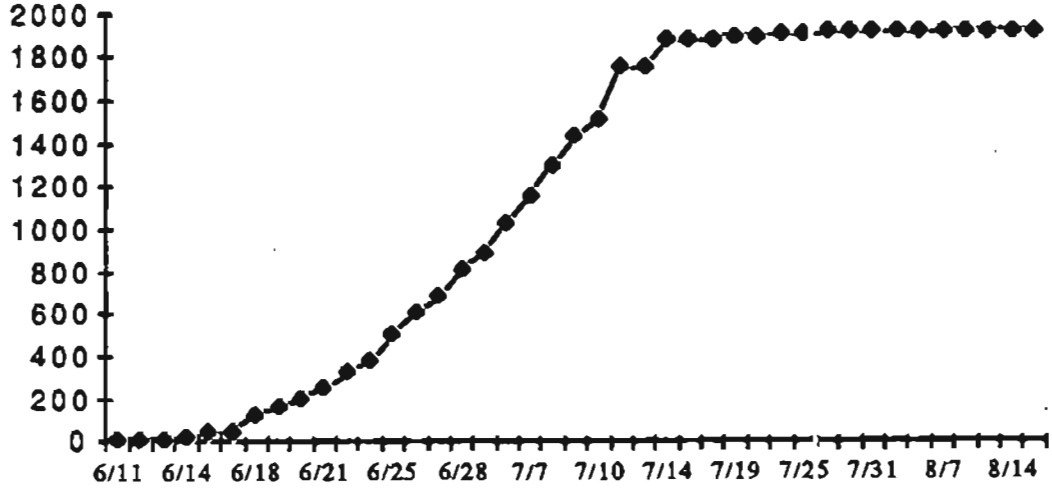

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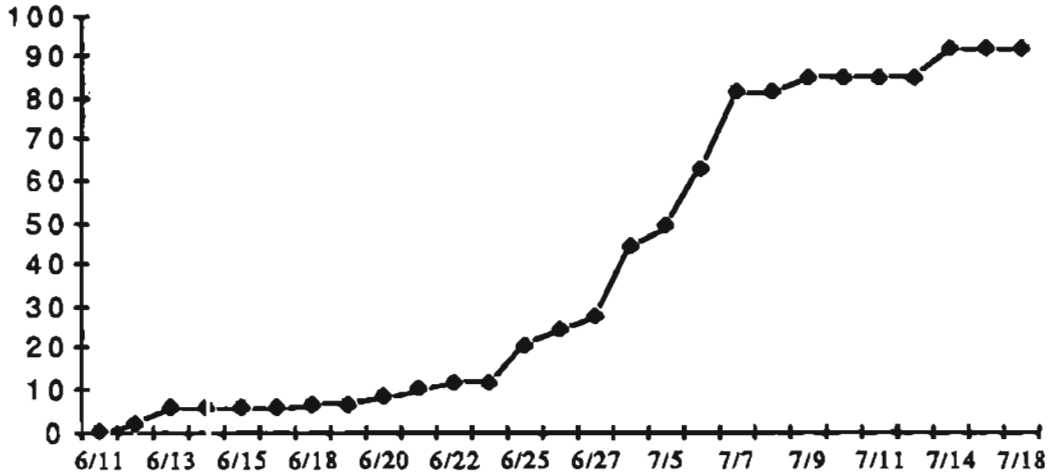

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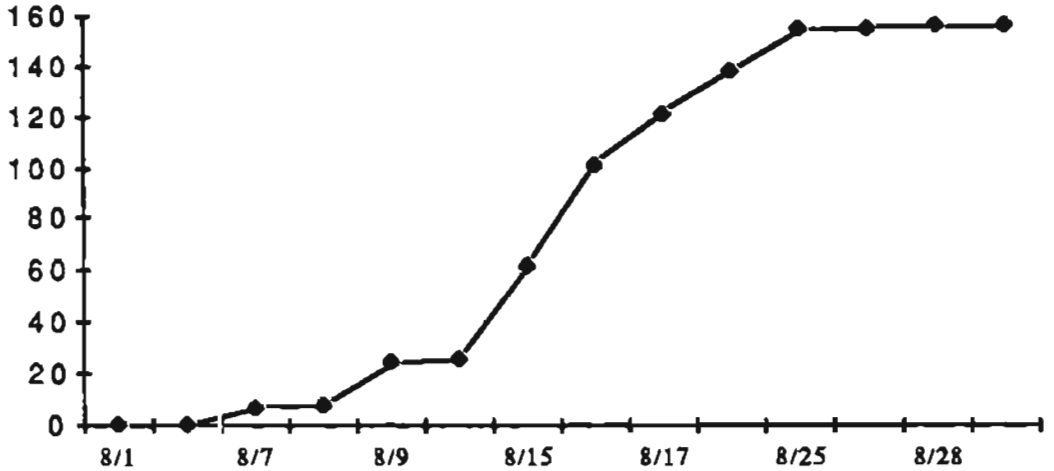
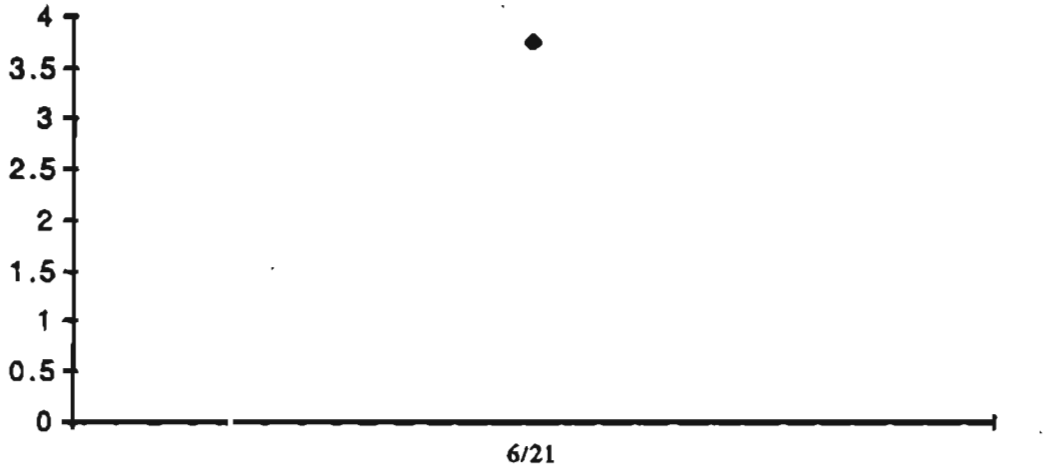
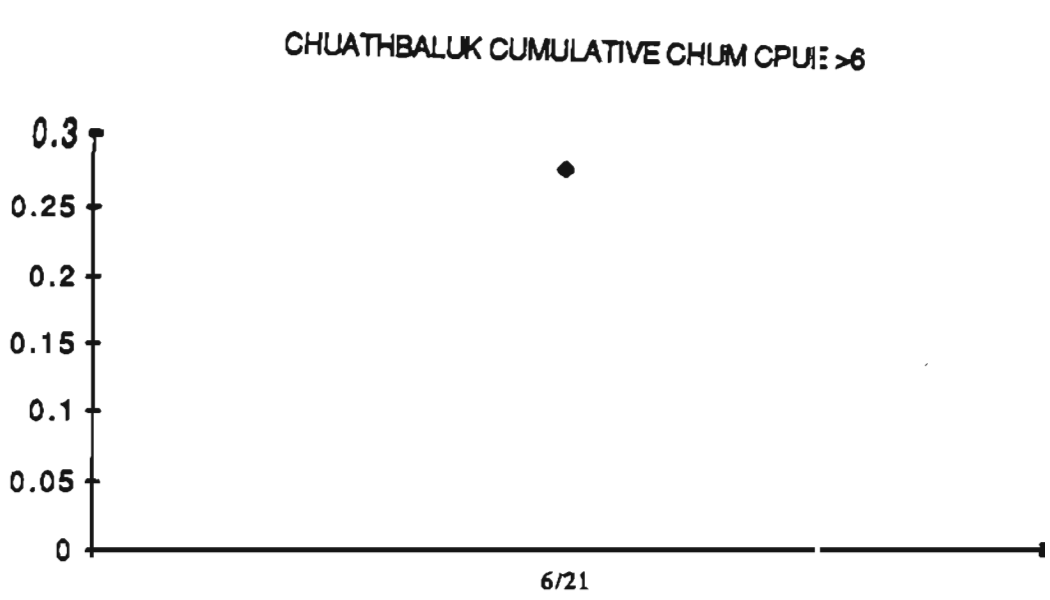


CHUATHBALUK CUMULATIVE KING CPUE >6




CHUATHBALUK CUMULATIVE CHUM CPUE >6
0.3
0.25
0.2
0.15
0.1
0.05
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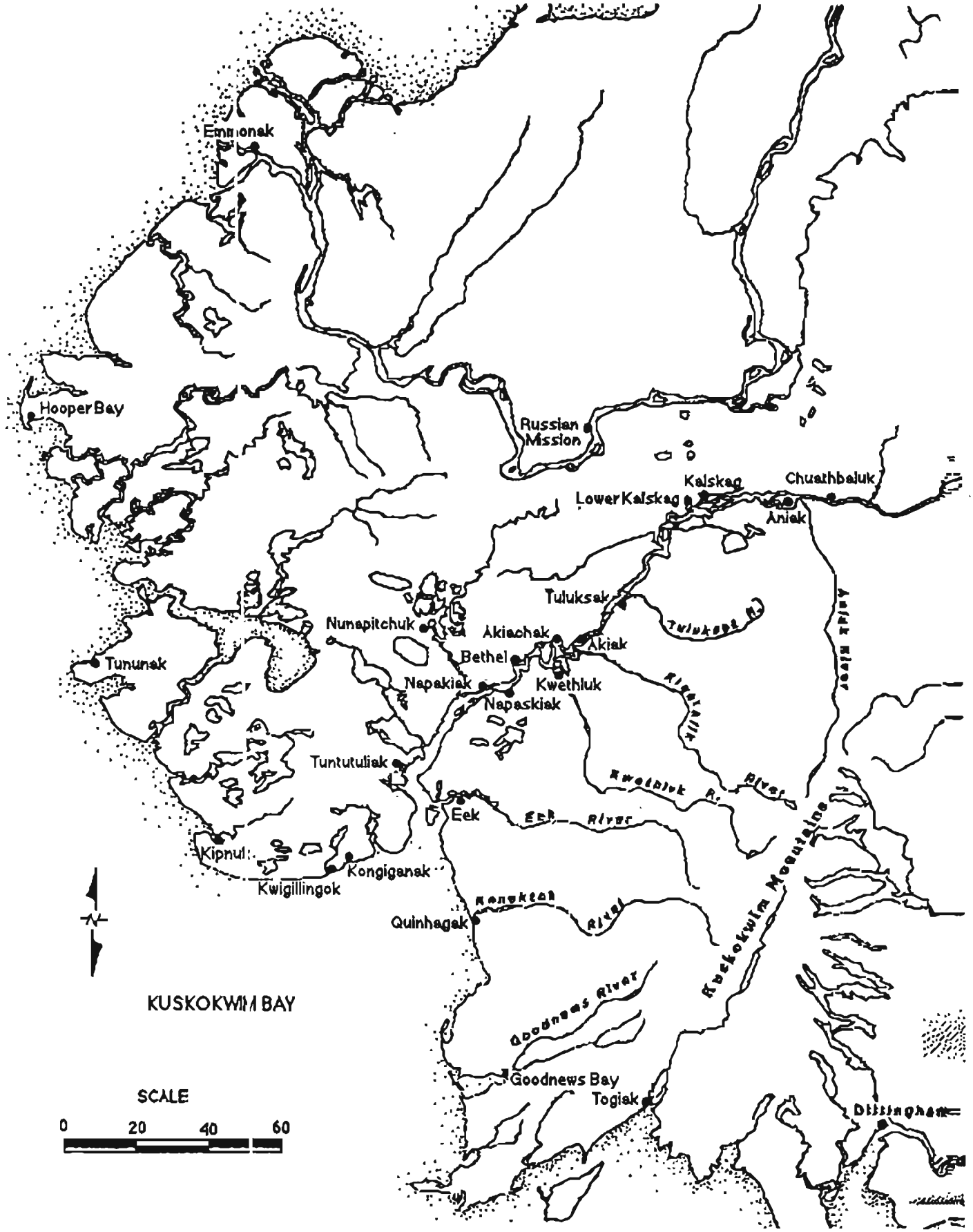
6/21

Attachment A: Map of the study area prepared by ADF&G staff.


Emmonak
Hooper Bay
Russian Mission
Kalskag
Chuathbaluk
Lower Kalskag
Aniak
Tuluksak
Nunapitchuk
Akiachak
Akiak
Bethel
Tununak
Napakiak
Kwethluk
Napaskiak
Tuntutuliak
Eek
Kipnuk
Kongiganak
Kwigillingok
Quinhagak
KUSKOKWIM BAY
Goodnews Bay
Togiak
Dillingham
SCALE
0
20
40
60

Attachment B: Letter from ADF&G to KFC regarding review comments on report as submitted. Note that a revised draft was not prepared.

STATE OF ALASKA

STEVE COWPER, GOVERNOR

DEPARTMENT OF FISH AND GAME

333 RASPBERRY ROAD
ANCHORAGE, ALASKA 99518-1599
PHONE: (907) 344-0541

COMMERCIAL FISHERIES

December 14, 1988

Mr. Bob Charles
C/O Kuskokwim Fishermen's Cooperative
P.O. Box 245
Bethel, Alaska 99559

Dear Bob:

Thank you for the timely submission of your report summarizing the results of the inseason subsistence fishery monitoring project conducted on the Kuskokwim River this past season. We realize that much of the effort this first season was channeled into getting the project organized and the communications network established so that the data could be quickly gathered and presented to the working group. This wasn't a simple job and the department commends the Coop. for what they were able to accomplish.

I have distributed your report to my regional biometrician along with both regional and area research and management staff to give them an opportunity to review and comment on your report. They have finally completed this initial review and have not only offered some constructive suggestions on how to better analyze and present the results but have also requested that you provide additional raw data before they can complete their review.

First of all, the following are specific comments and recommendations on the report:

1. An example of the form or forms that the survey personnel used to collect the data should be included in an Appendix.

2. It is not clear how CPUE by species was calculated for a day surveyed. As described, it appears the CPUE of individual fishermen within a sector was averaged to arrive at a daily value. There is a problem with this if the effort among the individuals surveyed on a day varies a lot. By taking the mean of individual CPUE's, the CPUE of a fisherman who fishes for 8 hours during a day is given the same weight as the CPUE for a fisherman that only fishes for 2 hours. A better estimate of daily CPUE would be to divide the total catch of a species by all individuals interviewed on the same day. For a simplistic example, suppose two subsistence fishermen were interviewed on a day, 1 who fished for 2 hours and caught no fish and one who fished for eight hours and caught 24 fish. If the means of the

CPUE's were taken the daily CPUE would be 1.5 (assuming net lengths were the same). However, if the daily totals were used the estimated CPUE for that day would be (24/10) or 2.40. It could be argued that 2.40 is a better index of the abundance on that day than 1.50.

3. The CPUE graphs need some reorganization and rescaling. The graphs should be organized by species by mesh size and presented in order of location, from those closest to the mouth to those furthest upriver. For each species, the scale on the X and Y axes should be the same. Also, the x-axis should be presented so that there is a correspondence between the tic-marks and real dates, as it is now one unit on the x-axis can represent anywhere from 2 to 5 days.

4. In the Appendix Tables, a column should be added showing the number of fishermen interviewed at a location on each day. All CPUE should be presented to the same number of decimal points (preferably 1). Also, it is not clear what blanks in the CPUE by species indicate as opposed to zeros. (Do they mean different things?)

Looking ahead to the 1989 season and beyond it will be essentia that we treat the data in a clear and consistent manner so that comparisons can be made between years and reasonable conclusions can be drawn from the data to help make management decisions. We should also consider ways to cut the cost of operating this project in the future without sacrificing the usefulness of the data. This could include the elimination of selected sectors and/or the number of fishermen contacted in each sector. Since the timing and length of subsistence fishing periods on the Kuskokwim River varies within a season and between seasons depending on the fishing schedule of the commercial fishery there should be consideration given to how to best interpolate for missed days.

With the information presented in your report we can not currently comment on ways to determine which sectors should be interviewed in the future and which sectors should be eliminated, what an optimal sample size for number of interviews is and how CPUE should be interpolated for days when there are no data. To make these determinations, we would need to examine the raw database having the effort and catch by individual subsistence fishermen by day by location.

The annual preseason staff meeting for the Kuskokwim area is scheduled for January 18-20 in Anchorage. Kim Francisco will b developing an meeting agenda and a discussion of this projec will be included so that we can begin formulating plans for the

1989 season. We won't have time for further evaluation of this project prior to that meeting but it would be helpful to have the additional data we need prior to that meeting. Perhaps you and Kim could discuss this further and maybe he could bring the data with him when he comes to Anchorage. Kim and his staff can get back to you following the meeting and update you on our progress.

We appreciate your contribution to this effort and don't hesitate to call us if you have questions.

Best regards,

Rich Randall
AYK Regional Supervisor

cc: Larry Buklis
Rich Cannon
Bob Conrad
Kim Francisco
Dan Huttunen

Attachment C: Memorandum from Robert Conrad to Rich Randall regarding recommendations for the 1989 study based on the 1988 results.

MEMORANDUM State of Alaska

TO: Rich Randall
Regional Supervisor, Region III
Division of Commercial Fisheries
Department of Fish and Game
Anchorage

DATE: February 3, 1989

FILE NO:

TELEPHONE NO: (907)-267-2379

FROM: Robert Conrad RC
Biometrician, Region III
Division of Commercial Fisheries
Department of Fish and Game
Anchorage

SUBJECT: Kuskokwim inseason subsistence survey for 1989

I have completed my analysis of the effort and catch data collected during the inseason subsistence survey of the Kuskokwim River during 1988. The attachment enclosed summarizes the analysis and presents my recommendations. These recommendations are based solely on an examination of the data and do not address any requirements specific to management.

I recommend that a meeting be scheduled for the last week of February or first week of March for interested parties to discuss the recommendations and finalize a sampling plan for 1989. This will allow an RFP for the project to be developed in plenty of time before the season starts.

If there are any questions about my analysis please contact me.

CC. R. Cannon,
L. Buklis,
K. Francisco,
D. Huttunen,
D. Schneiderhan

ANALYSIS OF DATA COLLECTED DURING THE INSEASON SUBSISTENCE SURVEY OF THE KUSKOKWIM RIVER IN 1988

The survey of subsistence fishermen was conducted from 31 May through 28 August at 12 locations between river mile (RM) 35 and RM 223 of the Kuskokwim River. Locations surveyed were:

Location Number	River Mile	Village/Fish Camp
1	35	Tuntutuliak
2	58	Tuntutuliak fish camp near Johnson River
3	65	Napakiak
4	71	Napaskiak
5	72	Nick O'Nick's fish camp near Oscarville
6	78	Steamboat Slough near Bethel
7	99	Kwelthluk Y fish camp
8	105	Akiakchak
9	118	Akiak
10	136	Tuluksak
11	192	Kalskag
12	223	Chuathbaluk

At each location, daily subsistence effort and harvest by participating fishermen was collected. Data recorded from each fisherman was: gear type (drift or set gillnet); mesh size (either ≤ 6 inches or > 6 inches); net depth (in meshes); net length (in fathoms); effort (in hours to the nearest 0.01); and number of chinook, chum, sockeye, coho, and pink salmon harvested.

The total number of interviews conducted during the survey period ranged from 48 at Kalskag to 227 at Akiakchak (Table 1). At nine of the twelve locations more than 70% of the interviews were conducted in June. The number of interviews collected after 30 June declined greatly at every location but one, Chuathbaluk (Figure 1). The maximum number of interviews collected during August (26) was at Akiakchak.

Interviewed fishermen used four gear-type/mesh-size combinations: (1) drift gillnets with mesh sizes ≤ 6 inches; (2) drift gillnets with mesh sizes > 6 inches; (3) set gillnets with mesh sizes ≤ 6 inches; and (4) set gillnets with mesh sizes > 6 inches. Drift gillnets were used by the majority of interviewed fishermen at every location but one, Akiak (Table 1). The most common mesh size used in drift gillnets varied by location. For the dura-

tion of this memo, small mesh refers to the category with mesh sizes ≤ 6 inches and large mesh to the category with mesh sizes > 6 inches.

A standardized measure of catch per unit of effort (CPUE) for each species was calculated from each interview. CPUE was calculated using the conventions of the test fish project for the Kuskokwim River where CPUE is standardized for a 100 fm net fished for 60 minutes. CPUE for each species was calculated as:

$$CPUE = (6{,}000 \cdot C)/(L \cdot T)$$

where C is the catch of a species in numbers of fish, L is the length of net in fathoms, and T is effort in minutes.

CPUE by Gear Type and Mesh Size

In the report submitted by the Co-op, daily CPUE data for drift and set gillnets were combined and mean CPUE by mesh size category was reported. I compared CPUE for the two gear types within each mesh size category to determine whether it was appropriate to combine them. For this comparison, I used data from days and locations when there were a minimum of three interviews for each gear type (drift or set gillnet) for the mesh size category being tested. There were sufficient CPUE data for comparison of chinook, chum, and sockeye salmon only.

The Mann-Whitney rank sum test (Conover 1980) was used to compare CPUE by species for the two gear types. This nonparametric procedure based on ranks was selected because: the test does not require a normality assumption for the data; it does not require normal variance estimates; and the sample sizes were generally small. As an example, at Akiak on 21 June there were four interviews of fishermen who used drift gillnets with small mesh and three interviews with fishermen who used set gillnets with small mesh. Individual CPUEs of chinook salmon for these seven interviews were ranked from smallest (1) to largest (7) and the mean rank by gear type calculated. If the two gear types had similar values for CPUE, mean ranks would be nearly equal. The Mann-Whitney test uses the mean ranks to determine if differences are significant.

For the comparison of CPUE by drift gillnets and set gillnets with small mesh, there were data from three day/location samples. Two of the three comparisons were significantly different ($P \leq 0.10$) for each species

(Table 2). In every comparison, mean CPUE[1] by set gillnets was less than that for drift gillnets (Appendix Table 1).

For the comparison of CPUE by drift gillnets and set gillnets with large mesh, there were data from 14, 11, and 9 day/location samples for chinook, chum, and sockeye salmon, respectively. When both gear types had a CPUE of 0.0 for a species they were omitted from the analysis. Twelve of the 14 comparisons were significantly different ($P \leq 0.10$) for chinook, 4 of the 11 were significantly different for chum, and none of the 9 comparisons for sockeye were significantly different (Table 2). For 33 of the 34 comparisons (with CPUE > 0.0), mean CPUE by set gillnets was less than that for drift gillnets (Appendix Table 2).

Based on these tests, I recommend that CPUE data from drift gillnets not be combined with data from set gillnets when computing mean daily CPUE for a location. This is clearly true for chinook and chum salmon. The argument is not as strong for sockeye salmon, but for consistency it makes sense to follow a similar procedure for sockeye, also.

I also compared CPUE by small mesh and large mesh drift gillnets to determine if these data could be pooled when computing a mean daily CPUE. There was not sufficient data to perform a similar comparison for set gillnets. The same testing procedures were used as described previously for the comparison of gear types.

There were data from 18 day/location samples for this comparison. Six of the 18 comparisons were significantly different ($P \leq 0.10$) for chinook, 13 of the 18 comparisons were significantly different for chum, and 5 of the 18 comparisons for sockeye were significantly different (Table 2). For chum and sockeye salmon, mean CPUE by small mesh drift gillnets was greater than mean CPUE for large mesh drift gillnets in all but one of the 36 comparisons (Appendix Table 3). For chinook salmon, large mesh nets had higher mean CPUE than small mesh nets for 13 of the 18 comparisons (Appendix Table 3). This supports the common wisdom of not pooling CPUE data from the two mesh size categories.

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[1] Mean CPUE is the mean of the individual fishermen CPUE for a species.

Trends in CPUE for Each Species by Location

I next plotted daily mean CPUE for each species (except pink salmon) by location to visually compare trends in CPUE for locations that are close to each other. Data from set gillnets were omitted from further analysis because: (1) there were not nearly the number of interviews from set gillnets compared to drift gillnets; and (2) the scale of mean CPUE data from set gillnets was much smaller than for drift gillnets and I felt drift gillnet CPUE better reflected abundance. Intuitively, one could argue that drift gillnet CPUE is more sensitive to changes in abundance because it is fished actively while set gillnets are fished passively. Daily mean CPUE by species for days when no data were collected was estimated by linear interpolation.

For reference, daily mean CPUE by the test fishing project is shown for chinook, chum, sockeye, and coho salmon in Figure 6. Please note that the scale of the graph for a species is different than the scale used to display daily mean CPUE by subsistence fishermen for that species. This was necessary because of the lower CPUE values by the test fish project. The graphs for each species in Figure 6 are scaled to one-fourth for chinook and chum salmon, one-half for sockeye salmon, and one-third for coho salmon.

Chinook Salmon:

Daily mean CPUE of chinook salmon at Tuntutuliak (location 1), Bethel (location 6), and Akiakchak (location 8) display the most evident trends (Figure 2). There is nothing which clearly distinguishes the trends at locations 2 through 5. Daily mean CPUE of chinook salmon for upriver locations 10, 11, and 12 (Tuluksak, Kalskag, and Chuathbaluk) are all much lower than those at other locations and relatively constant through time.

Chum Salmon:

Daily mean CPUE of chum salmon at Tuntutuliak (location 1), Tuntutuliak fish camp (location 2), Nick O'Nick's (location 5), Bethel (location 6), and Akiakchak (location 8) display the most evident trends (Figure 3). There is nothing which clearly distinguishes the trends at locations 3 and 4. Daily mean CPUE of chum salmon for upriver locations 10, 11, and 12 (Tuluksak, Kalskag, and Chuathbaluk) are all much lower than those at other locations and relatively constant through time.

Sockeye Salmon:

Daily mean CPUE of sockeye salmon at Tuntutuliak (location 1), Nick O'Nick's (location 5), Bethel (location 6), and Akiakchak (location 8) display the most evident trends (Figure 4). There is nothing which clearly distinguishes the trends at locations 2 through 4. Daily mean CPUE of sockeye salmon for upriver locations 11 and 12 (Kalskag and Chuathbaluk) are all much lower than those at other locations and relatively constant through time.

Coho Salmon:

Daily mean CPUE of coho salmon at Tuntutuliak (location 1), Bethel (location 6), Kwelthluk (location 7), and Akiakchak (location 8) display the most evident trends (Figure 5). Locations 2, 4, and 11 have very small sample sizes (4, 2, and 2, respectively). There is nothing which clearly distinguishes the trends at locations 3 and 5. The daily mean CPUE of coho salmon for upriver locations 10 and 12 (Tuluksak and Chuathbaluk) are all much lower than those at other locations and relatively constant through time.

Recommendations

The following recommendations are based solely on an examination of the 1988 data and assume that in the future, sample sizes, use of gear types, and temporal distribution of effort will be similar to 1988. Needs of management may override some of these recommendations.

1. The survey should be designed to maximize the collection of data from fishermen using drift gillnets for subsistence fishing. The data from set gillnets is limited by small sample sizes and relatively low CPUE. Given this consideration, location 9 (Akiak) should be omitted from future surveys since this is the only location where a majority of the interviews were from set gillnets.

2. Location 11 (Kalskag) should be omitted from future surveys because of the small number of interviews collected there (total of 48).

3. The most upriver location, Chuathbaluk, should be omitted because of generally small catch rates there.

4. Locations 2, 3, and 4 generally display similar trends in daily mean CPUE so only one of these location needs to be surveyed. Based on sample sizes for both small mesh and large mesh drift gillnets and temporal distribution of effort, location 3 (Napakiak) is probably the best choice.

5. Locations 5 (Nick O'Nick's) and 6 (Bethel) generally display similar trends in daily mean CPUE, also. Based on catch rates and temporal distribution of effort, Bethel is probably the best choice.

6. Locations 7 and 8 generally display similar trends in daily mean CPUE so only one location needs to be surveyed. Based on sample sizes for both small mesh and large mesh drift gillnets and temporal distribution of effort, location 8 (Akiakchak) is probably the best choice.

7. The sample sizes for any specific day-location-gear/mesh combination were generally small. The data do not warrant any consideration of an optimum sample size; as many interviews as possible should be collected at survey sites.

Summary

Five locations, 1 (Tuntutuliak), 3 (Napakiak), 6 (Bethel), 8 (Akiakchak), and 10 (Tuluksak), should be surveyed during June and July for monitoring chinook, chum, and sockeye salmon. These locations give coverage of the lower (Tuntutuliak and Napakiak), middle (Bethel and Akiakchak), and upper (Tuluksak) portions of that section of the river surveyed. The value of Tuluksak is marginal. If an upriver site is not necessary for management purposes it should probably be dropped from the survey.

Only 3 locations, 1 (Tuntutuliak), 6 (Bethel), and 8 (Akiakchak), should be surveyed during August for monitoring coho salmon.

LITERATURE CITED

Conover, W. J. 1980. Practical Nonparametric Statistics. John Wiley and Sons, New York. 493 pp.

Table 1. Summary of the number of fishermen interviewed, by gear type and month, for each location in the subsistence monitoring program for the Kuskokwim River, 1988.

Gear:	Drift Gillnet		Set Gillnet			Percentage
Mesh Size:	≤ 6"	> 6"	≤ 6"	> 6"	Total	of Total
Location 1						
June	23	50	0	5	78	71.6
July	19	1	0	0	20	18.3
August	10	1	0	0	11	10.1
Total	52	52	0	5	109	
Percentage	47.7	47.7	0.0	4.6		
Location 2						
June	36	8	0	12	56	82.3
July	8	0	0	0	8	11.8
August	3	0	1	0	4	5.9
Total	47	8	1	12	68	
Percentage	69.1	11.8	1.5	17.6		
Location 3						
June	34	30	1	41	106	82.2
July	6	3	0	0	9	7.0
August	14	0	0	0	14	10.8
Total	54	33	1	41	129	
Percentage	41.8	25.6	0.8	31.8		
Location 4						
June	65	46	4	30	145	97.4
July	2	0	0	0	2	1.3
August	2	0	0	0	2	1.3
Total	69	46	4	30	149	
Percentage	46.3	30.9	2.7	20.1		
Location 5						
June	33	85	21	8	147	84.0
July	11	2	5	0	18	10.3
August	2	0	8	0	10	5.7
Total	46	87	34	8	175	
Percentage	26.3	49.7	19.4	4.6		
Location 6						
June	16	72	4	31	123	79.4
July	11	1	2	0	14	9.0
August	14	0	4	0	18	11.6
Total	41	73	10	31	155	
Percentage	26.5	47.1	6.4	20.0		

-continued-

Table 1. Summary of the number of fishermen interviewed, by gear type and month, for each location in the subsistence monitoring program for the Kuskokwim River, 1988 (continued).

Gear:	Drift Gillnet		Set Gillnet			Percentage
Mesh Size:	≤ 6"	> 6"	≤ 6"	> 6"	Total	of Total
Location 7						
June	15	17	3	16	51	61.4
July	11	0	2	0	13	15.7
August	18	0	1	0	19	22.9
Total	44	17	6	16	83	
Percentage	53.0	20.5	7.2	19.3		
Location 8						
June	38	33	30	56	157	69.2
July	34	0	10	0	44	19.4
August	26	0	0	0	26	11.4
Total	98	33	40	56	227	
Percentage	43.2	14.5	17.6	24.7		
Location 9						
June	4	33	13	40	90	81.8
July	6	0	5	0	11	10.0
August	7	0	2	0	9	8.2
Total	17	33	20	40	110	
Percentage	15.4	30.0	18.2	36.4		
Location 10						
June	48	24	6	7	85	76.6
July	16	1	0	0	17	15.3
August	8	0	1	0	9	8.1
Total	72	25	7	7	111	
Percentage	64.9	22.5	6.3	6.3		
Location 11						
June	19	12	4	11	46	95.8
July	0	0	0	0	0	0.0
August	1	0	1	0	2	4.2
Total	20	12	5	11	48	
Percentage	41.7	25.0	10.4	22.9		
Location 12						
June	30	0	3	1	34	42.0
July	15	0	14	0	29	35.8
August	7	0	11	0	18	22.2
Total	52	0	28	1	81	
Percentage	64.2	0.0	34.6	1.2		

Table 2. Summary of the results for the Mann-Whitney rank sum tests of the differences between mean daily CPUE of chinook, chum, and sockeye salmon for the three gear-mesh combinations examined for the Kuskokwim subsistence survey, 1988.

CHINOOK			CHUM			SOCKEYE		
Num. Sig.[1]	Num. of Tests	% Sig.	Num. Sig.[1]	Num. of Tests[2]	% Sig.	Num. Sig.[1]	Num. of Tests[2]	% Sig.
Drift Gillnet versus Set Gillnet, mesh size ≤ 6 inches								
2	3	67%	2	3	67%	2	3	67%
Drift Gillnet versus Set Gillnet, mesh size > 6 inches								
12	14	86%	4	11	36%	0	9	0%
Drift Gillnet, mesh size ≤ 6 inches versus mesh size > 6 inches								
6	18	33%	13	18	72%	5	18	28%

[1] Number of tests with significance levels ≤ 0.10.

[2] Does not include comparisons if both mean CPUE were equal to 0.0.

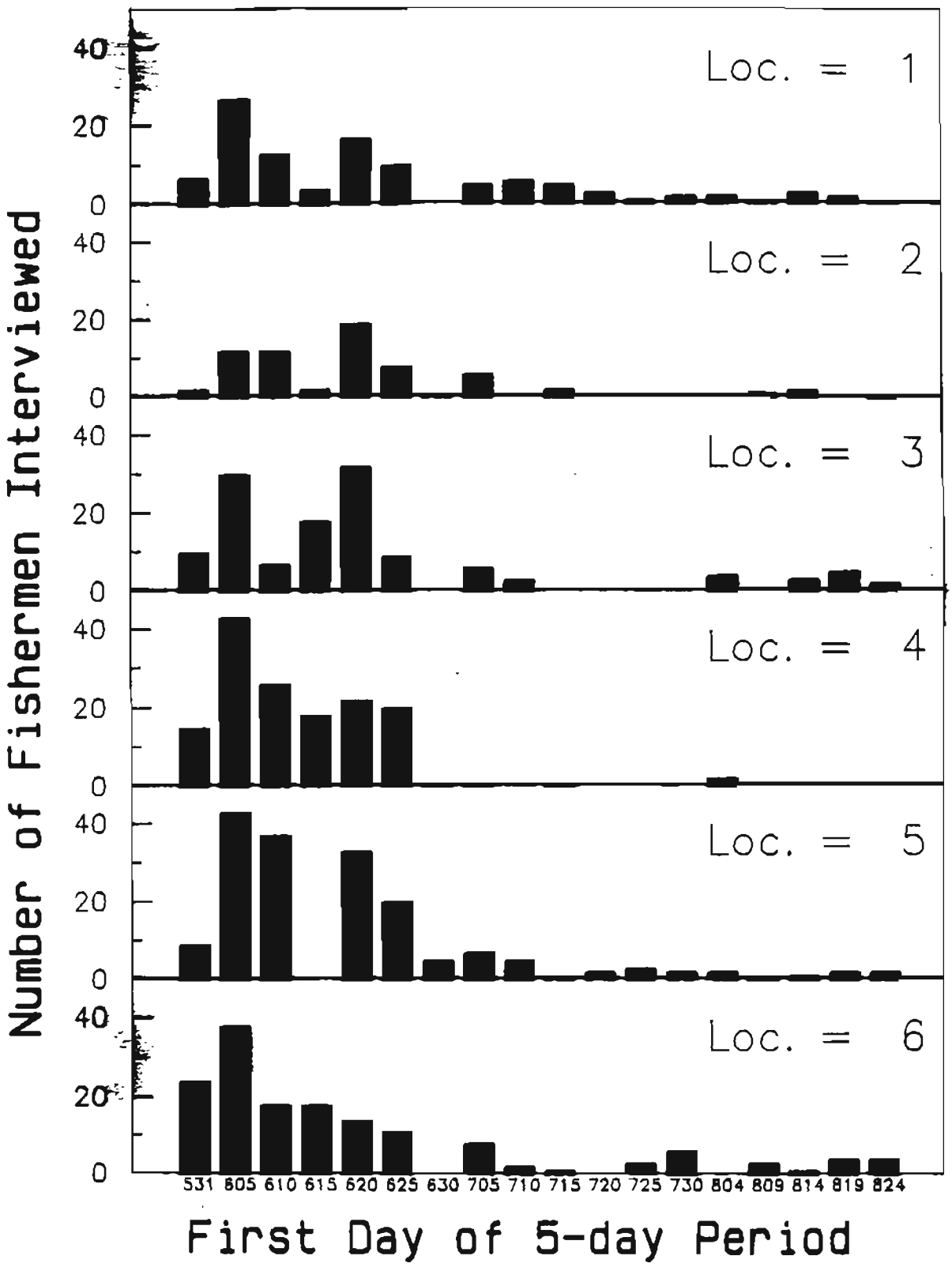

Figure 1. Number of subsistence fishermen interviewed (all gear types and mesh sizes combined) during 5-day periods for each location of the inseason subsistence survey of the Kuskokwim River, 1988.

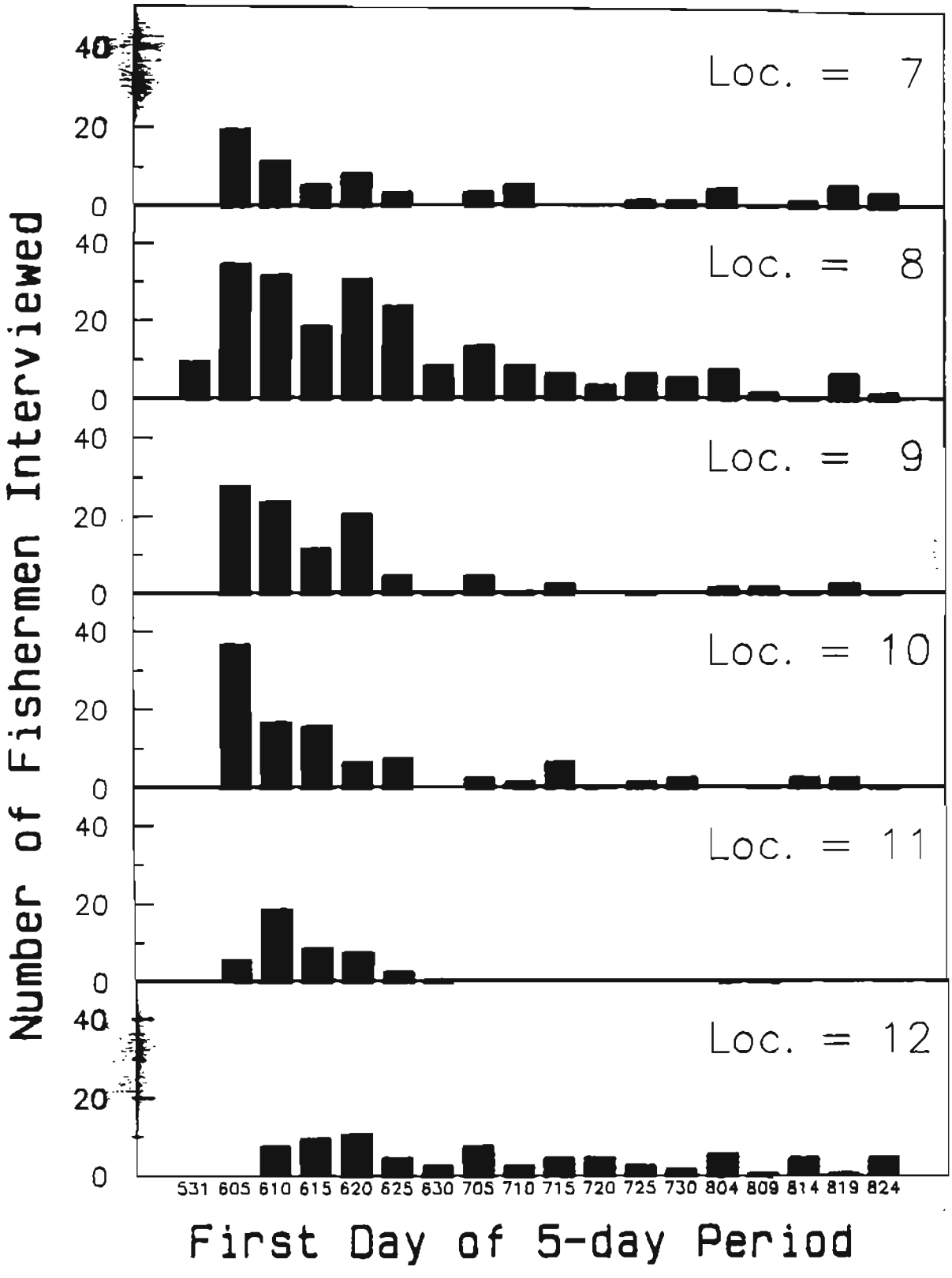

Figure 1. Number of subsistence fishermen interviewed (all gear types and mesh sizes combined) during 5-day periods for each location of the inseason subsistence survey of the Kuskokwim River, 1988 (continued).

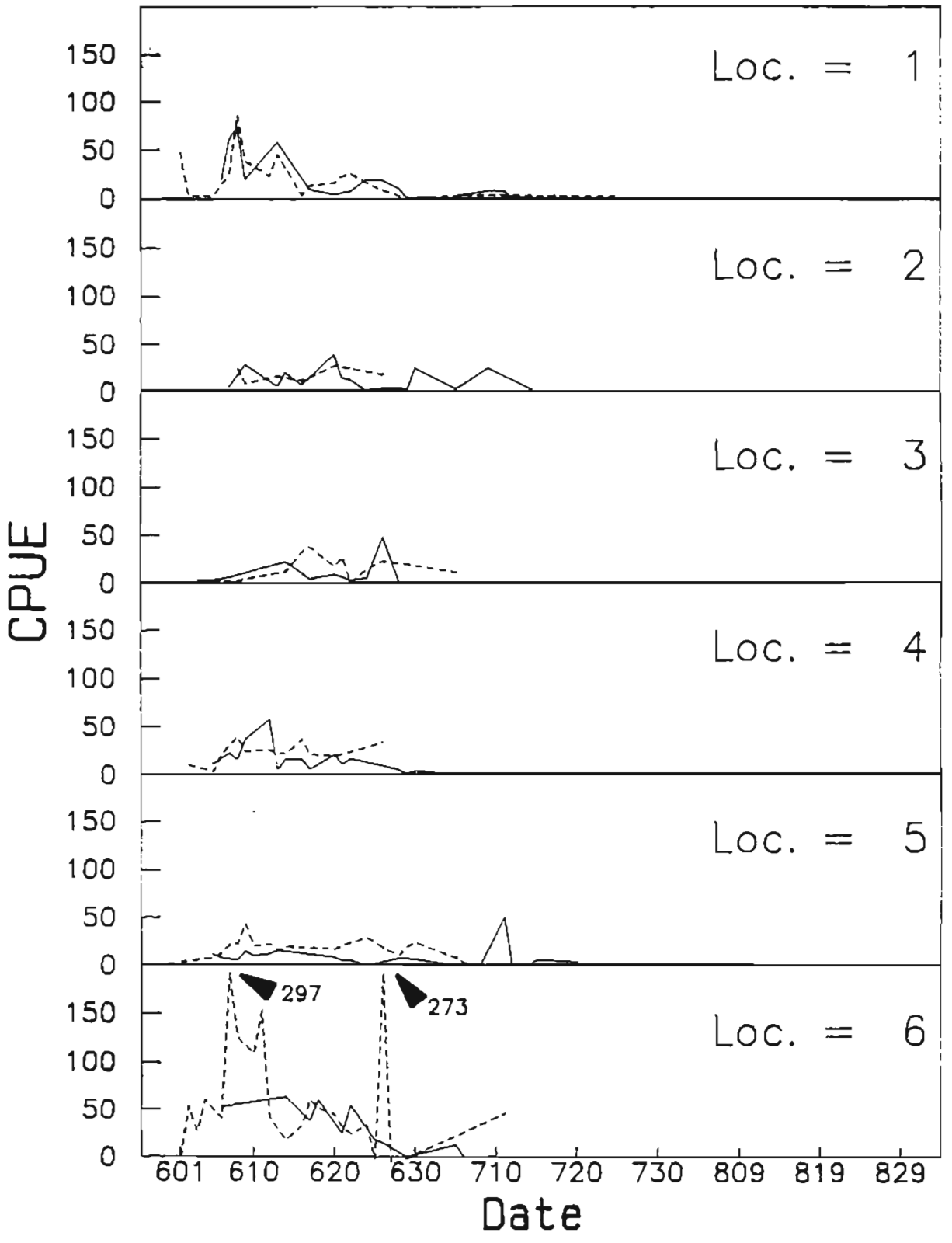

Figure 2. Mean daily CPUE of chinook salmon by subsistence fishermen using small mesh (———) and large mesh (- - -) drift gillnets, by location, for the Kuskokwim River, 1988.

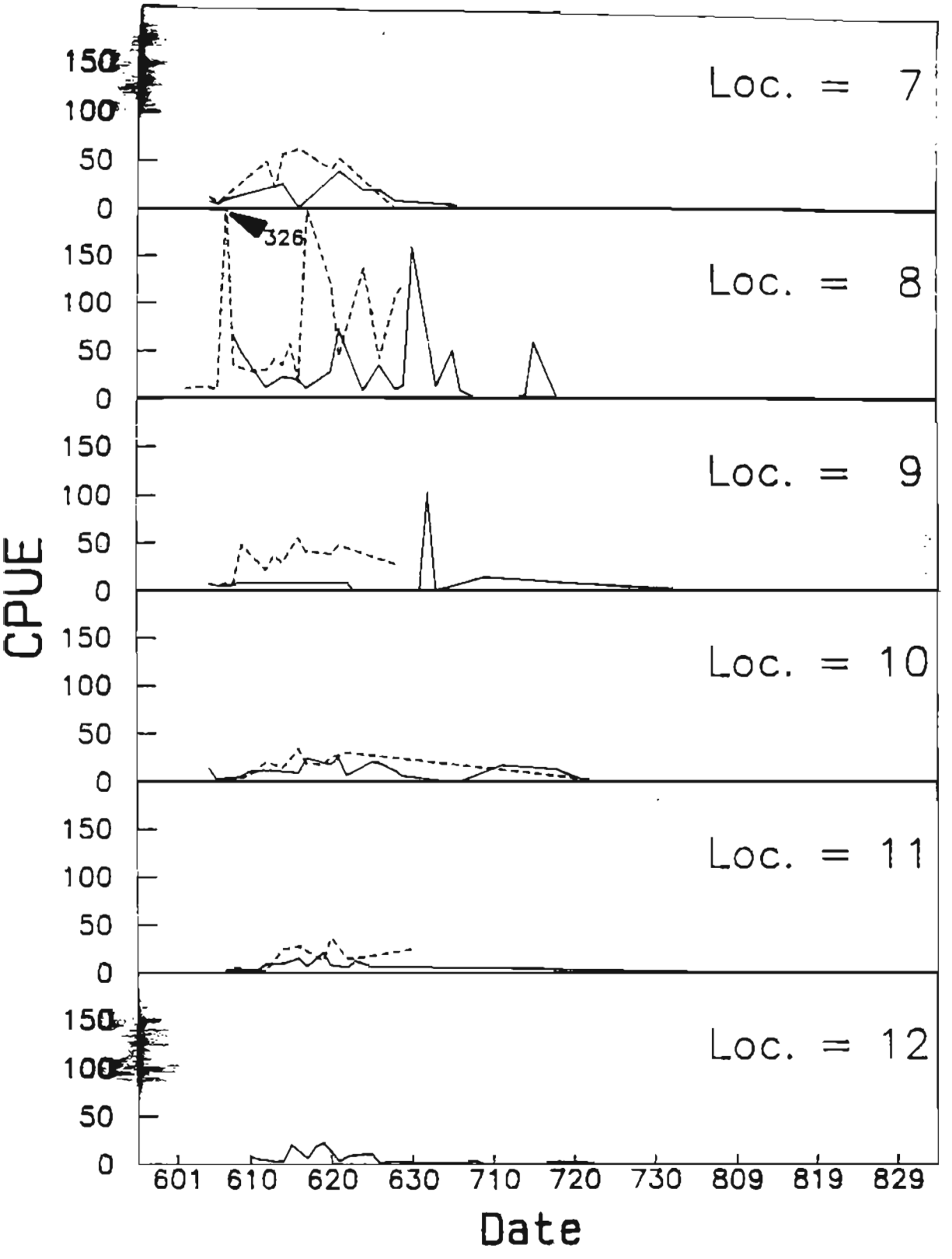

Figure 2. Mean daily CPUE of chinook salmon by subsistence fishermen using small mesh (———) and large mesh (- - -) drift gillnets, by location, for the Kuskokwim River, 1988 (continued).

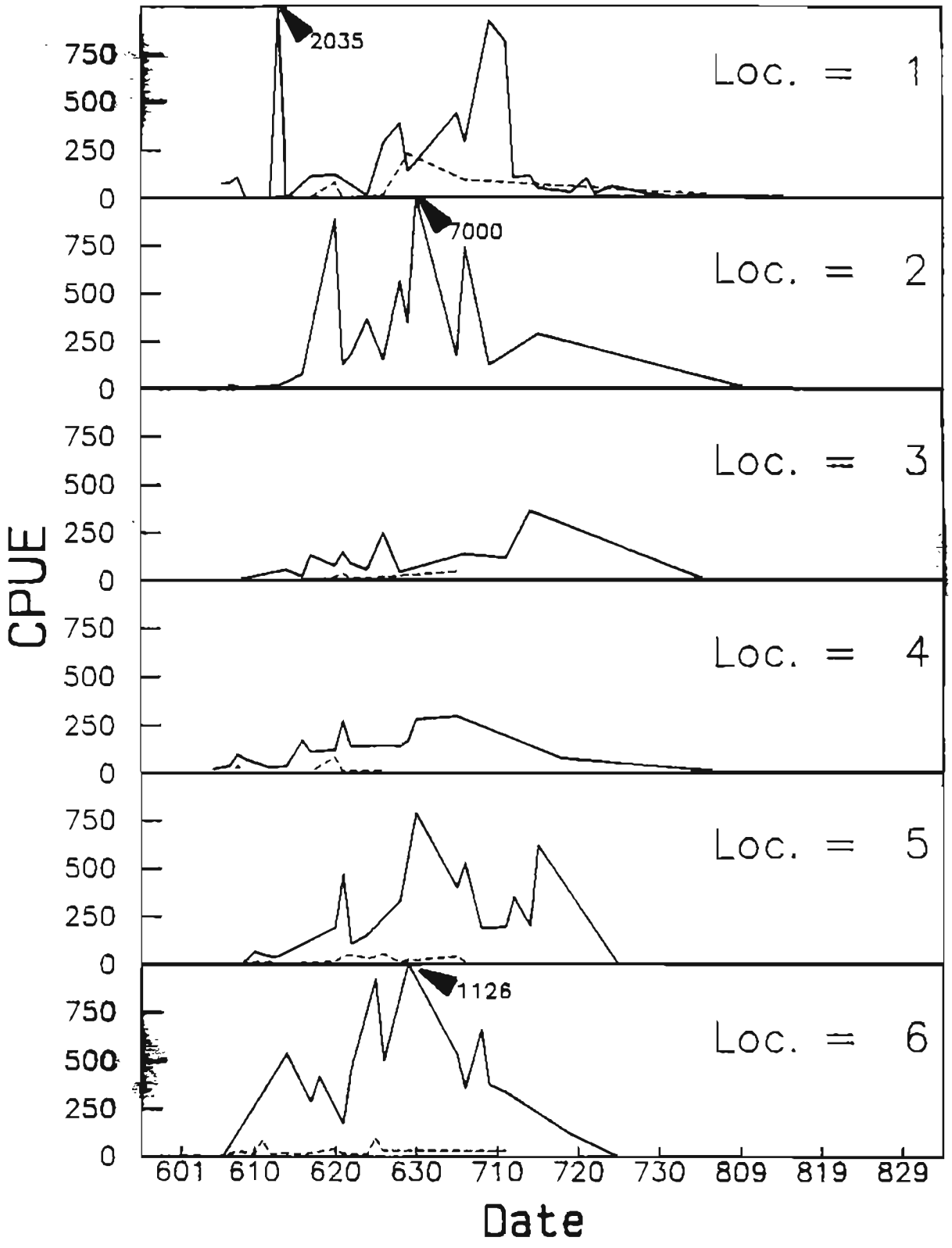

Figure 3. Mean daily CPUE of chum salmon by subsistence fishermen using small mesh (———) and large mesh (- - -) drift gillnets, by location, for the Kuskokwim River, 1988.

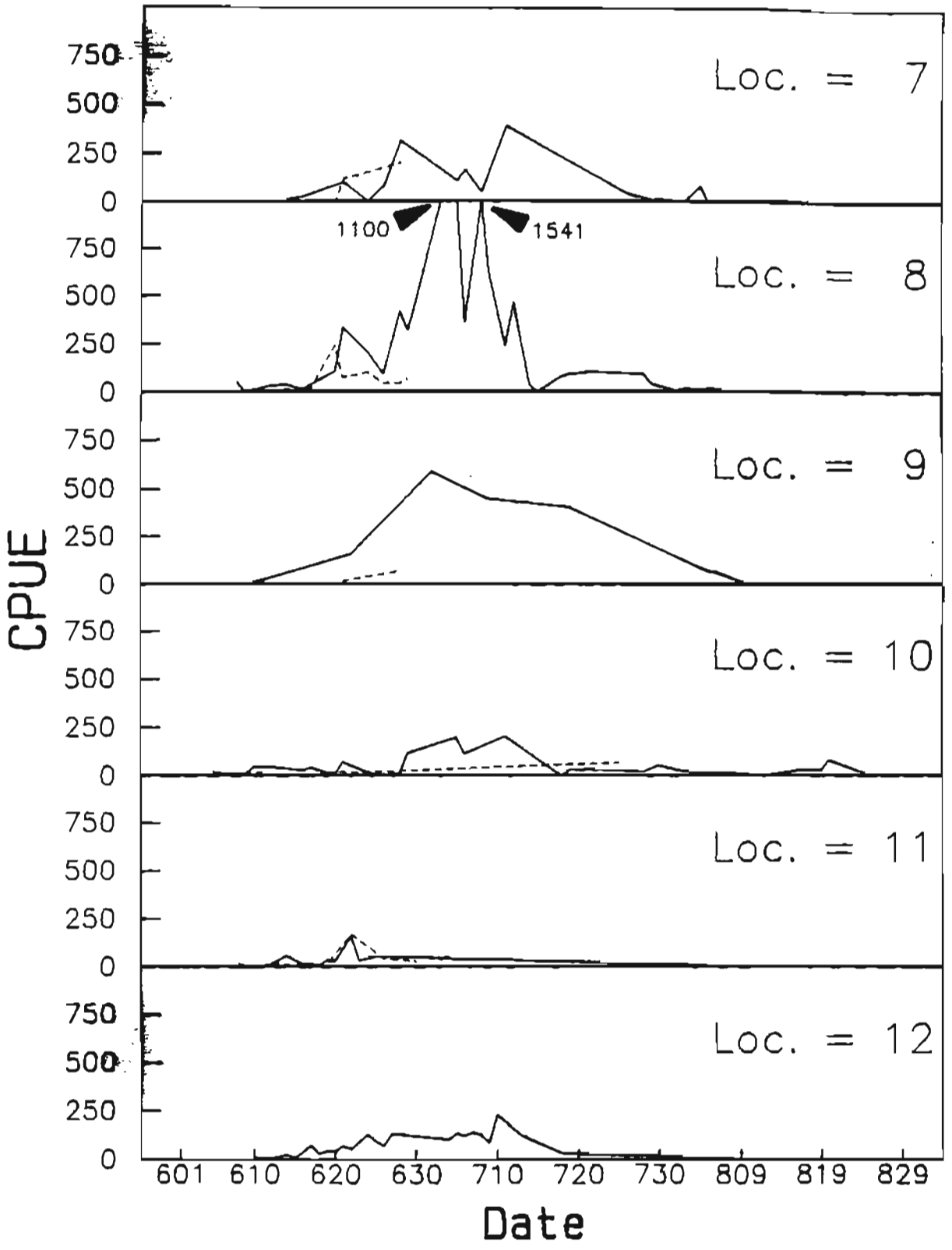

Figure 3. Mean daily CPUE of chum salmon by subsistence fishermen using small mesh (———) and large mesh (- - -) drift gillnets, by location, for the Kuskokwim River, 1988 (continued).

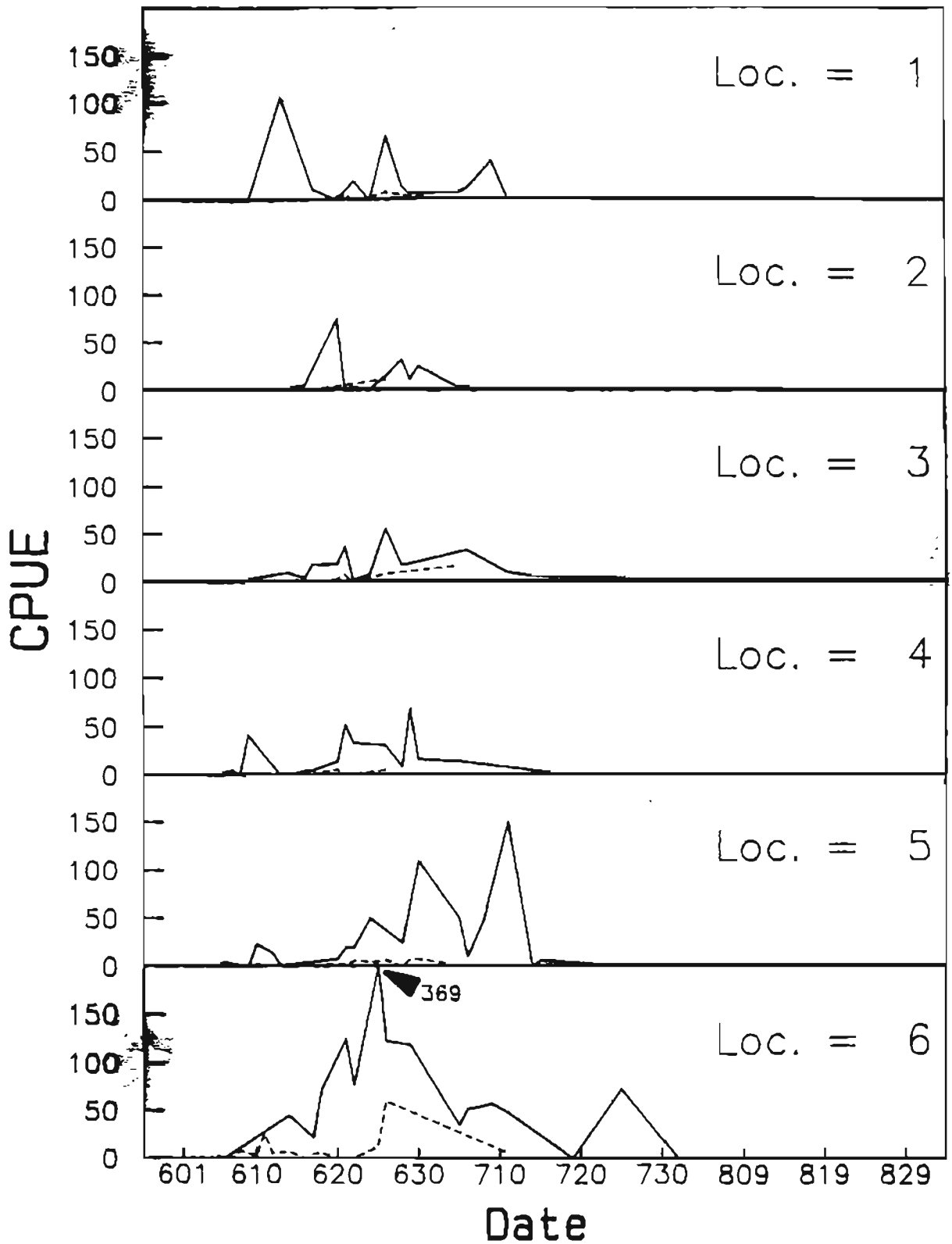

Figure 4. Mean daily CPUE of sockeye salmon by subsistence fishermen using small mesh (———) and large mesh (- - -) drift gillnets, by location, for the Kuskokwim River, 1988.

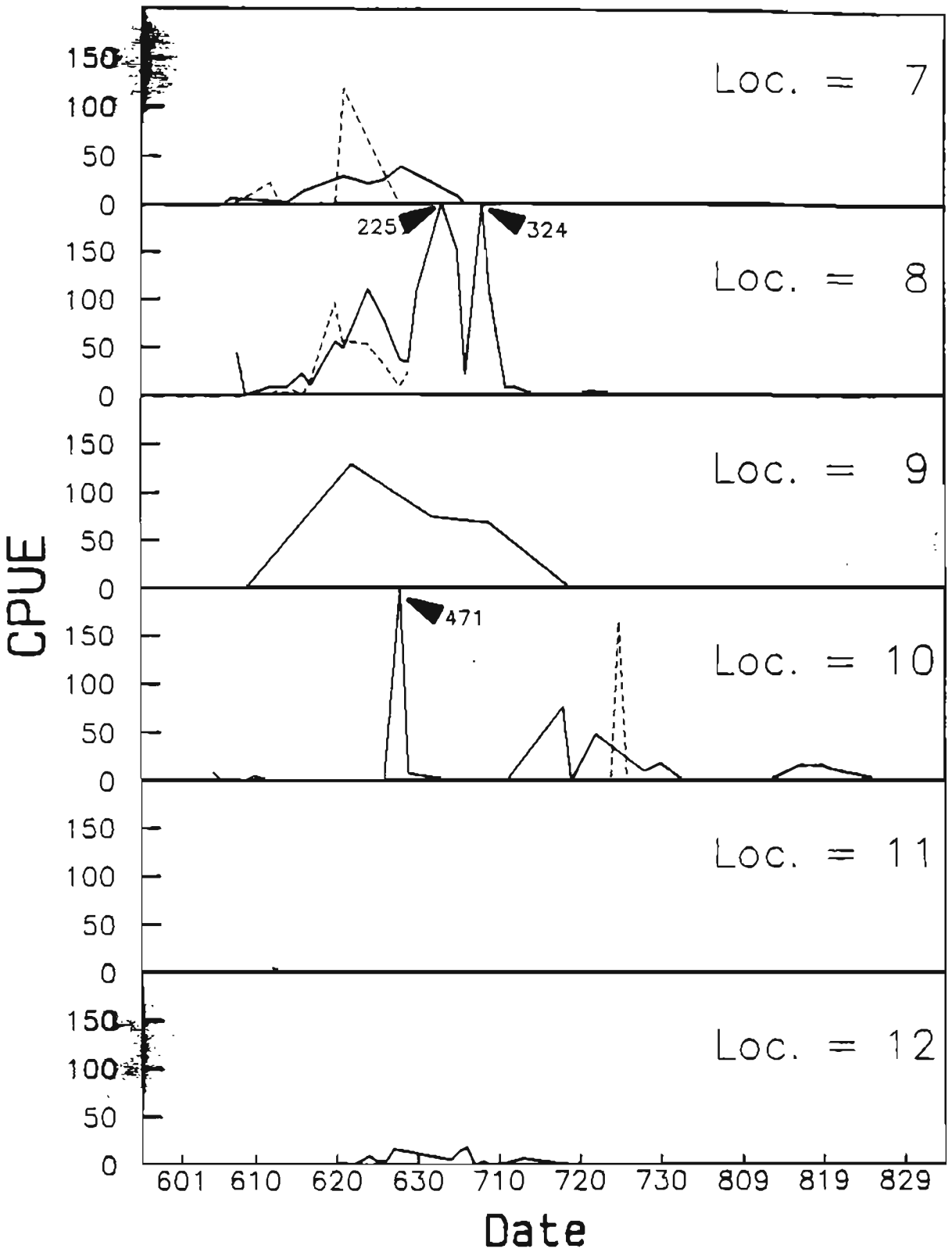

Figure 4. Mean daily CPUE of sockeye salmon by subsistence fishermen usir small mesh (———) and large mesh (- - -) drift gillnets, by location, for the Kuskokwim River, 1988 (continued).

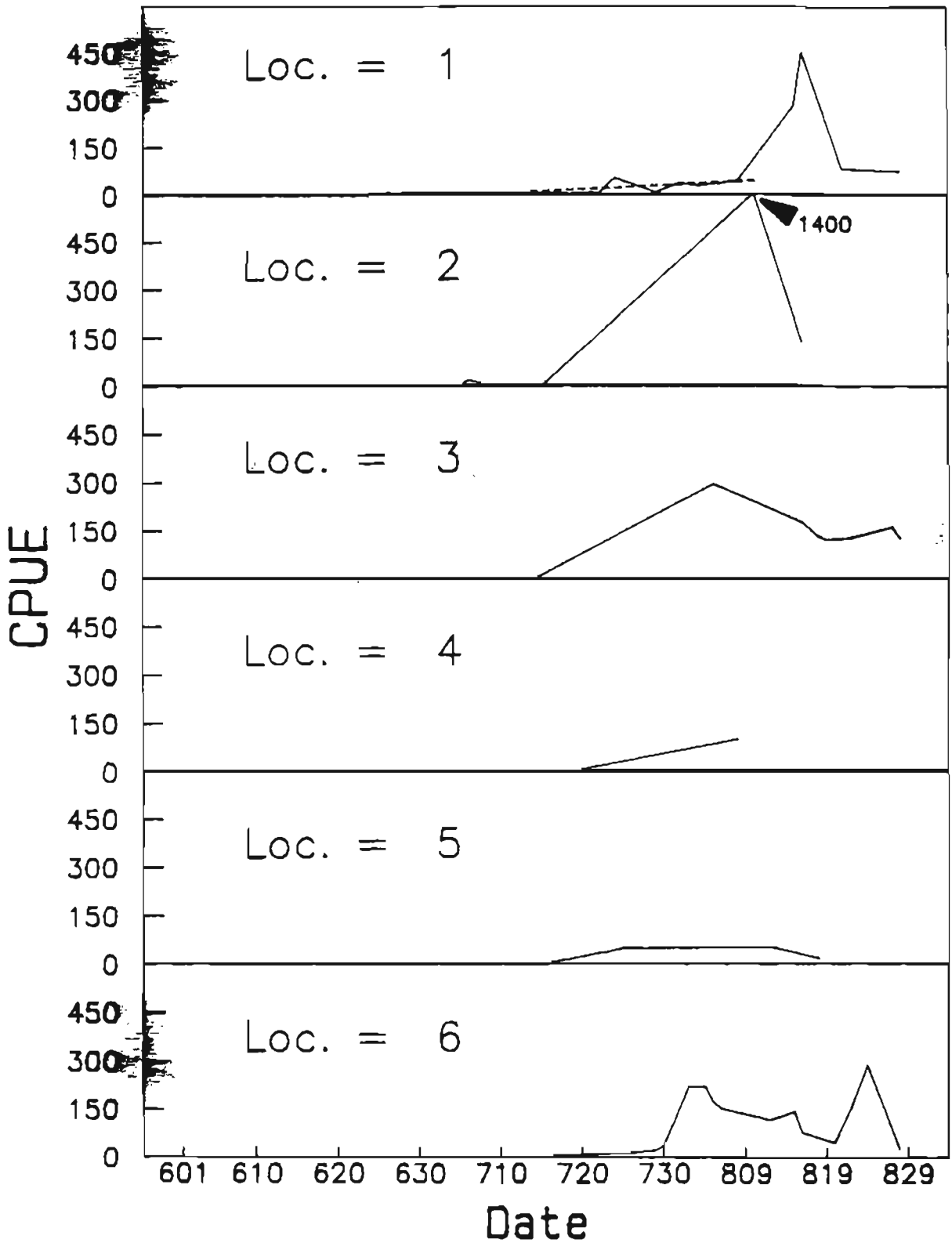

Figure 5. Mean daily CPUE of coho salmon by subsistence fishermen using small mesh (———) and large mesh (- - -) drift gillnets, by location, for the Kuskokwim River, 1988.

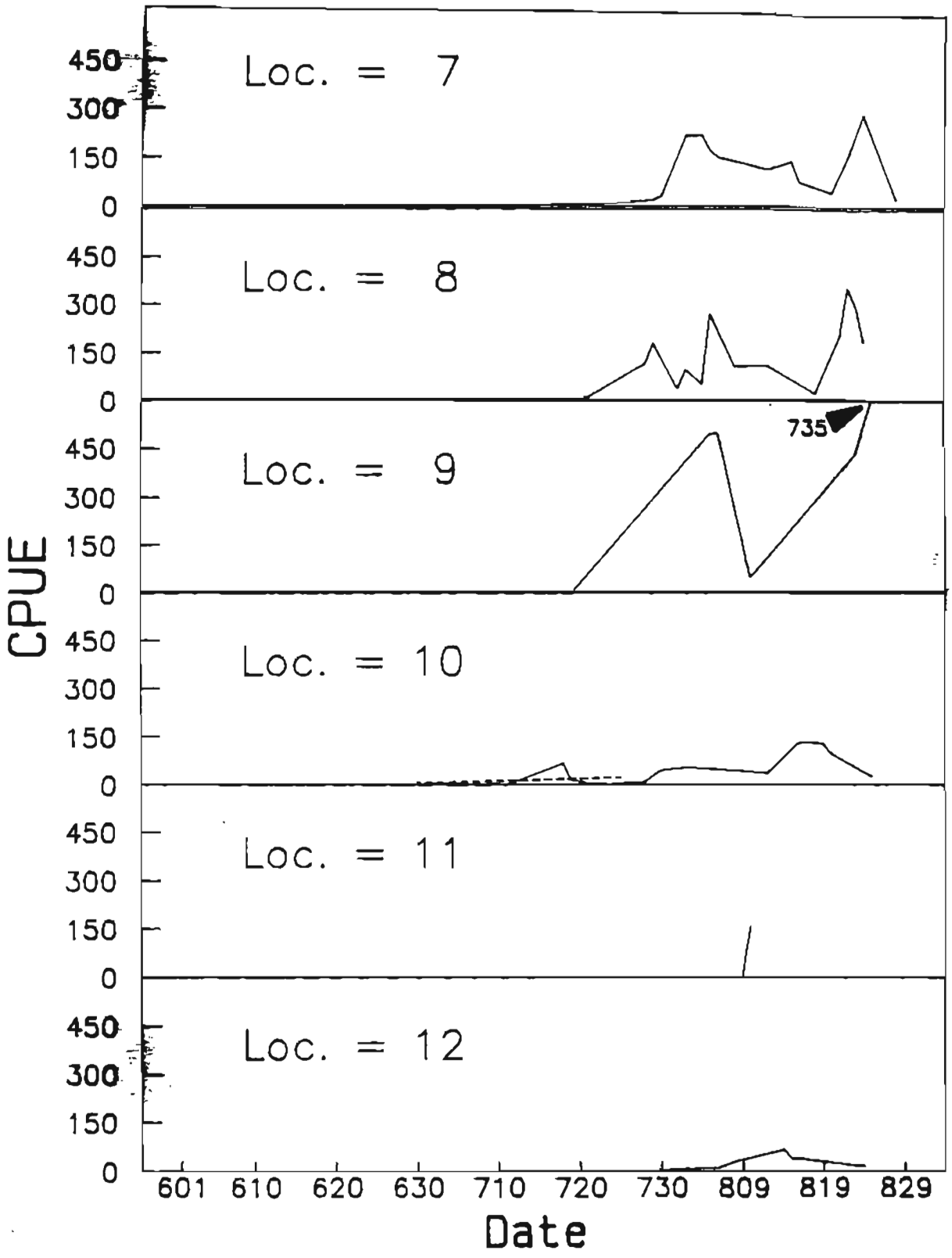

Figure 5. Mean daily CPUE of coho salmon by subsistence fishermen using small mesh (———) and large mesh (- - -) drift gillnets, by location, for the Kuskokwim River, 1988 (continued).

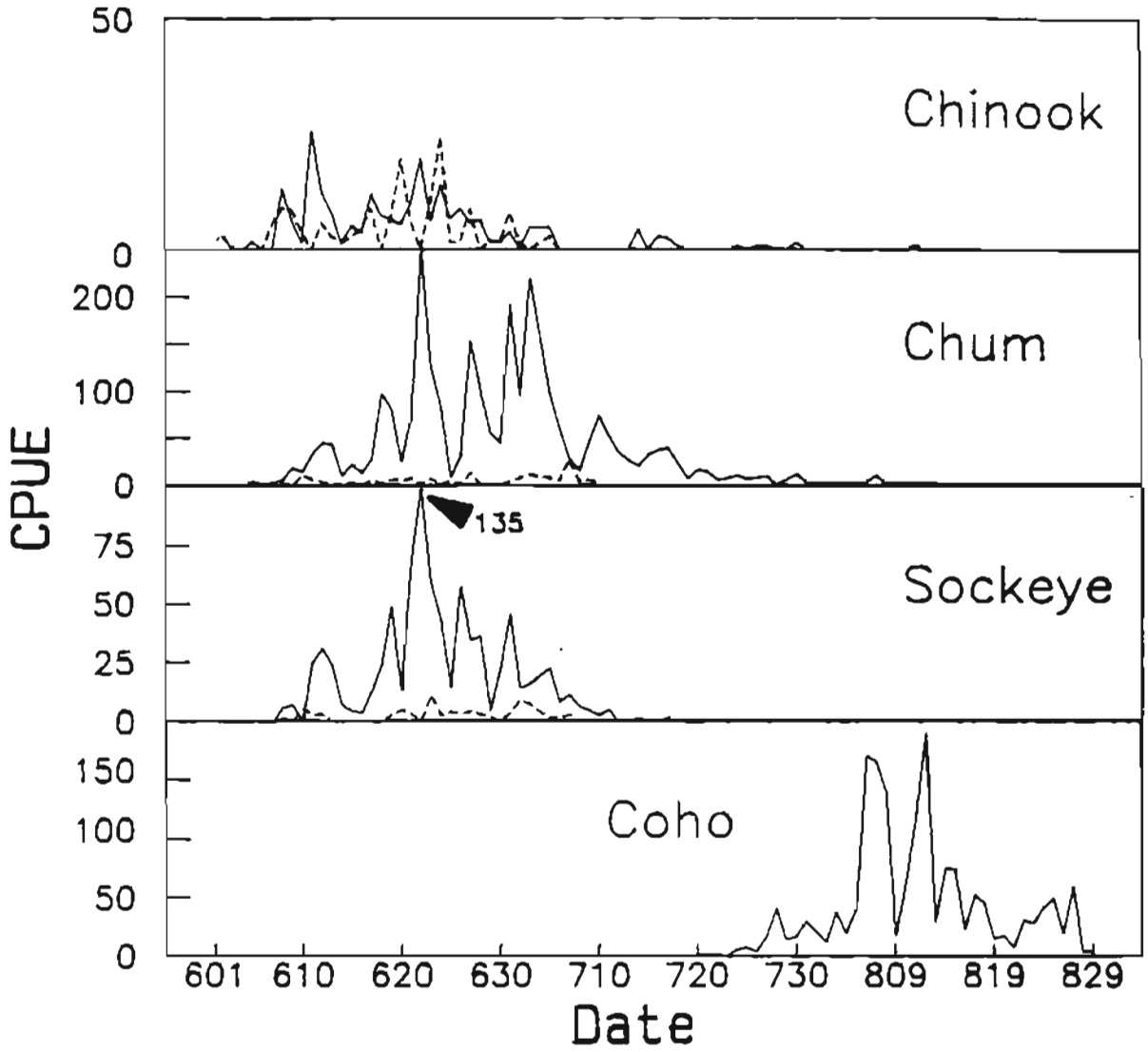

Figure 6. Mean daily CPUE of chinook, chum, sockeye, and coho salmon by the test fishing project on the Kuskokwim River for small mesh (———) and large mesh (- - -) drift gillnets, 1988.

Appendix Table 1. Summary statistics for the comparison of mean CPUE for drift gillnets (D) and set gillnets (S) with mesh sizes less than or equal to 6 inches. A significant difference between mean CPUE of the two gear types for the Mann-Whitney rank sum test is indicated by * ($0.05 > P \leq 0.10$) or ** ($P \leq 0.05$).

Date	Loc.	Gear Type	Sample Size	Mean Effort (hours)	CHINOOK Mean CPUE	CHUM Mean CPUE	SOCKEYE Mean CPUE
621	8	D	4	0.81	72.33	333.33	49.00
621	8	S	3	11.33	6.97	25.83	20.60
628	8	D	3	0.50	9.78**	419.11*	36.44*
628	8	S	3	13.00	0.28	17.08	3.23
629	8	D	4	0.44	14.00**	320.00*	34.00*
629	8	S	3	10.00	0.00	17.27	4.21

Appendix Table 2. Summary statistics for the comparison of mean CPUE for drift gillnets (D) and set gillnets (S) with mesh sizes greater than 6 inches. A significant difference between mean CPUE of the two gear types for the Mann-Whitney rank sum test is indicated by * ($0.05 > P \leq 0.10$) or ** ($P \leq 0.05$).

Date	Loc.	Gear Type	Sample Size	Mean Effort (hours)	CHINOOK Mean CPUE	CHUM Mean CPUE	SOCKEYE Mean CPUE
616	3	D	4	2.25	33.32*	3.39	2.70
616	3	S	3	14.67	2.00	0.79	0.09
602	4	D	4	1.50	10.50*	0.00	0.00
602	4	S	4	24.00	1.82	0.00	0.00
605	4	D	3	1.25	3.98*	0.00	0.00
605	4	S	6	24.00	1.20	0.00	0.00
606	4	D	4	2.75	21.63**	1.00	0.00
606	4	S	4	24.00	1.56	0.17	0.00
604	6	D	3	0.50	69.33**	0.00	0.00
604	6	S	4	7.50	12.19	0.00	0.00
605	6	D	7	0.48	58.85**	0.96	4.39
605	6	S	4	9.00	13.63	0.00	0.21
606	6	D	4	1.88	49.64	4.31**	0.25
606	6	S	5	6.00	33.20	0.50	2.75
608	6	D	7	0.57	133.79	28.19	8.55
608	6	S	3	6.00	106.05	3.89	8.22
607	7	D	3	2.00	15.76*	1.62**	0.81
607	7	S	3	18.67	2.33	0.06	0.00
607	8	D	3	3.06	326.33*	0.44	0.00
607	8	S	5	12.00	5.61	0.00	0.00
613	8	D	4	1.38	33.50**	9.25	5.00
613	8	S	3	10.00	12.10	2.92	1.11
612	9	D	6	1.92	22.45**	10.95**	1.17
612	9	S	4	24.00	2.28	0.05	0.19
613	9	D	5	2.10	37.40**	3.67	1.87
613	9	S	3	20.00	3.77	0.28	0.42
621	9	D	4	1.00	47.78*	18.06**	4.06
621	9	S	3	12.00	12.87	3.52	3.05

Appendix Table 3. Summary statistics for the comparison of mean CPUE for small mesh drift gillnets (≤ 6 inches [S]) and large mesh drift gillnets (> 6 inches [L]). A significant difference between mean CPUE of the two mesh sizes for the Mann-Whitney rank sum test is indicated by * ($0.05 > P \leq 0.10$) or ** ($P \leq 0.05$).

Date	Loc.	Gear Type	Sample Size	Mean Effort (hours)	CHINOOK Mean CPUE	CHUM Mean CPUE	SOCKEYE Mean CPUE
614	3	S	3	1.67	22.67	59.67**	10.00**
614	3	L	3	2.00	12.93	4.15	0.67
616	3	S	3	2.00	11.10	22.72	4.09
616	3	L	4	2.25	33.32	3.39	2.70
617	3	S	3	1.33	4.33	134.67*	18.67**
617	3	L	4	2.13	37.83	3.29	0.00
620	3	S	4	2.00	9.33	79.00**	18.50
620	3	L	5	1.50	17.93	18.47	3.53
621	3	S	4	0.75	6.89**	150.22	37.06
621	3	L	4	0.88	27.36	37.06	8.17
624	3	S	6	1.50	5.39**	58.50**	7.67
624	3	L	3	1.33	15.11	11.55	4.45
607	4	S	5	1.30	23.07	42.67**	4.80
607	4	L	5	1.50	31.27	2.73	0.80
609	4	S	4	1.38	37.49**	74.94**	41.68**
609	4	L	6	1.42	24.33	3.17	0.60
612	4	S	3	1.33	57.96	31.63	10.00*
612	4	L	4	0.78	26.50	7.50	0.00
614	4	S	3	1.00	16.67	41.33	0.00
614	4	L	3	1.00	22.67	4.00	1.33
616	4	S	4	1.00	16.50	174.00**	4.50
616	4	L	4	1.50	37.25	7.75	0.00
617	4	S	3	1.00	6.00**	113.33**	5.33
617	4	L	5	1.40	21.24	10.36	1.80
620	5	S	4	0.96	8.55	196.55**	8.24
620	5	L	6	1.67	17.24	16.54	3.54

-continued-

Appendix Table 3. Summary statistics for the comparison of mean CPUE for small mesh drift gillnets (≤ 6 inches [S]) and large mesh drift gillnets (> 6 inches [L]). A significant difference between mean CPUE of the two mesh sizes for the Mann-Whitney rank sum test is indicated by * ($0.05 > P \leq 0.10$) or ** ($P \leq 0.05$) (continued).

Date	Loc.	Gear Type	Sample Size	Mean Effort (hours)	CHINOOK Mean CPUE	CHUM Mean CPUE	SOCKEYE Mean CPUE
621	5	S	3	0.50	5.33**	469.33**	20.00
621	5	L	6	1.17	21.92	47.42	2.42
628	8	S	3	0.50	9.78*	419.11*	36.44
628	8	L	3	0.50	101.78	42.22	9.78
608	10	S	6	1.58	3.42	8.66**	0.74
608	10	L	3	2.33	5.52	2.43	0.00
610	10	S	5	1.30	11.67	48.18	5.67
610	10	L	4	1.50	8.50	17.50	0.00
617	10	S	4	1.25	25.33	44.33*	0.00*
617	10	L	3	2.33	20.22	3.88	0.83